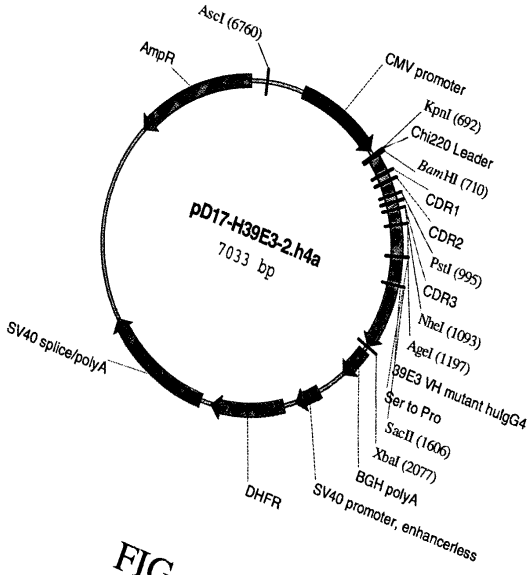
AscI (6760)
AmpR
CMV promoter
KpnI (692)
Chi220 Leader
BamHI (710)
CDR1
CDR2
PstI (995)
CDR3
NheI (1093)
AgeI (1197)
39E3 VH mutant hulgG4
Ser to Pro
SacII (1606)
XbaI (2077)
BGH polyA
SV40 promoter, enhancerless
DHFR
SV40 splice/polyA
pD17-H39E3-2.h4a
7033 bp

FIG. 1

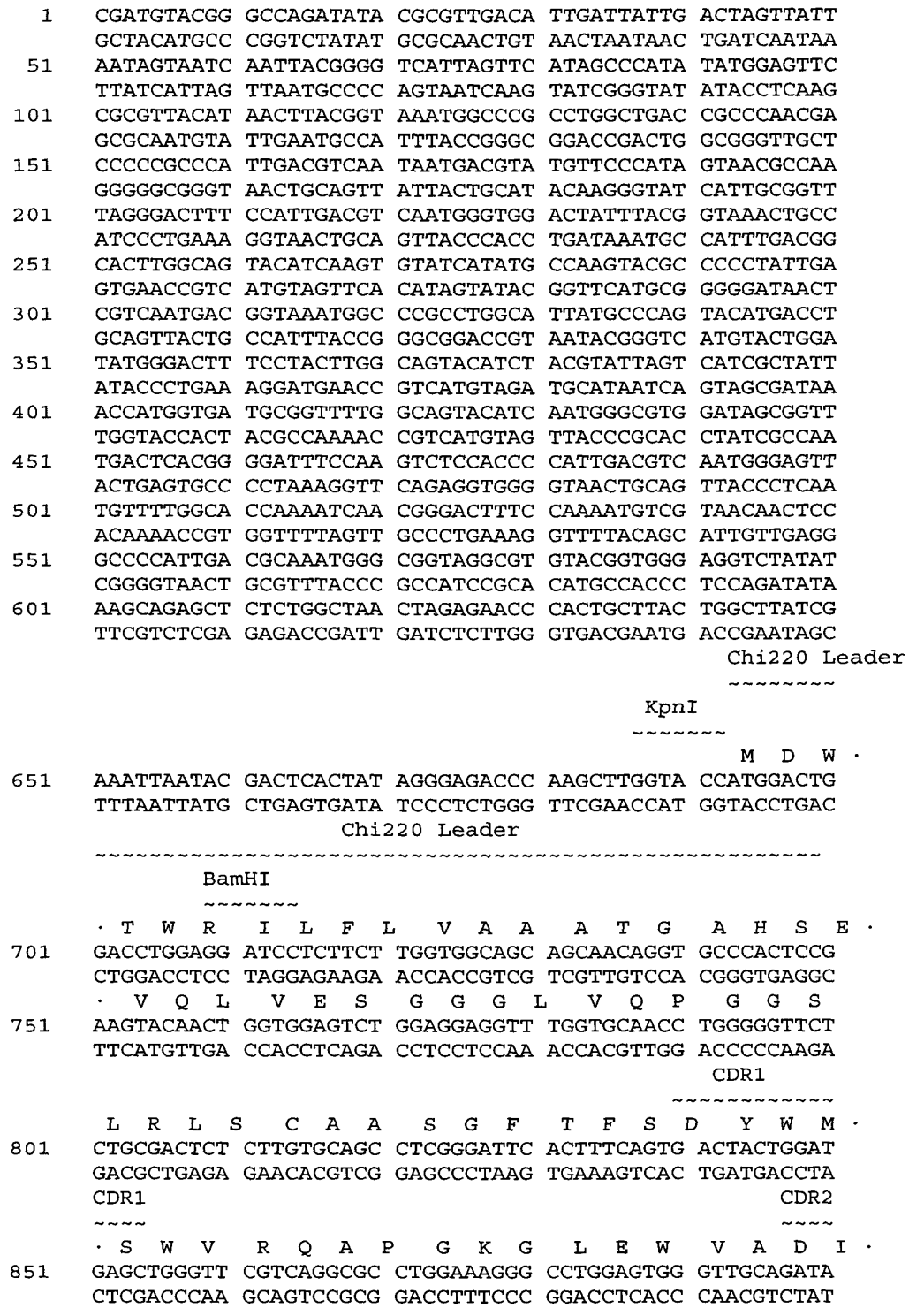
1 CGATGTACGG GCCAGATATA CGCGTTGACA TTGATTATTG ACTAGTTATT
GCTACATGCC CGGTCTATAT GCGCAACTGT AACTAATAAC TGATCAATAA
51 AATAGTAATC AATTACGGGG TCATTAGTTC ATAGCCCATA TATGGAGTTC
TTATCATTAG TTAATGCCCC AGTAATCAAG TATCGGGTAT ATACCTCAAG
101 CGCGTTACAT AACTTACGGT AAATGGCCCG CCTGGCTGAC CGCCCAACGA
GCGCAATGTA TTGAATGCCA TTTACCGGGC GGACCGACTG GCGGGTTGCT
151 CCCCCGCCCA TTGACGTCAA TAATGACGTA TGTTCCCATA GTAACGCCAA
GGGGGCGGGT AACTGCAGTT ATTACTGCAT ACAAGGGTAT CATTGCGGTT
201 TAGGGACTTT CCATTGACGT CAATGGGTGG ACTATTTACG GTAAACTGCC
ATCCCTGAAA GGTAACTGCA GTTACCCACC TGATAAATGC CATTTGACGG
251 CACTTGGCAG TACATCAAGT GTATCATATG CCAAGTACGC CCCCTATTGA
GTGAACCGTC ATGTAGTTCA CATAGTATAC GGTTCATGCG GGGGATAACT
301 CGTCAATGAC GGTAAATGGC CCGCCTGGCA TTATGCCCAG TACATGACCT
GCAGTTACTG CCATTTACCG GGCGGACCGT AATACGGGTC ATGTACTGGA
351 TATGGGACTT TCCTACTTGG CAGTACATCT ACGTATTAGT CATCGCTATT
ATACCCTGAA AGGATGAACC GTCATGTAGA TGCATAATCA GTAGCGATAA
401 ACCATGGTGA TGCGGTTTTG GCAGTACATC AATGGGCGTG GATAGCGGTT
TGGTACCACT ACGCCAAAAC CGTCATGTAG TTACCCGCAC CTATCGCCAA
451 TGACTCACGG GGATTTCCAA GTCTCCACCC CATTGACGTC AATGGGAGTT
ACTGAGTGCC CCTAAAGGTT CAGAGGTGGG GTAACTGCAG TTACCCTCAA
501 TGTTTTGGCA CCAAAATCAA CGGGACTTTC CAAAATGTCG TAACAACTCC
ACAAAACCGT GGTTTTAGTT GCCCTGAAAG GTTTTACAGC ATTGTTGAGG
551 GCCCCATTGA CGCAAATGGG CGGTAGGCGT GTACGGTGGG AGGTCTATAT
CGGGGTAACT GCGTTTACCC GCCATCCGCA CATGCCACCC TCCAGATATA
601 AAGCAGAGCT CTCTGGCTAA CTAGAGAACC CACTGCTTAC TGGCTTATCG
TTCGTCTCGA GAGACCGATT GATCTCTTGG GTGACGAATG ACCGAATAGC
Chi220 Leader
KpnI
M D W ·
651 AAATTAATAC GACTCACTAT AGGGAGACCC AAGCTTGGTA CCATGGACTG
TTTAATTATG CTGAGTGATA TCCCTCTGGG TTCGAACCAT GGTACCTGAC
Chi220 Leader
BamHI
· T W R I L F L V A A A T G A H S E ·
701 GACCTGGAGG ATCCTCTTCT TGGTGGCAGC AGCAACAGGT GCCCACTCCG
CTGGACCTCC TAGGAGAAGA ACCACCGTCG TCGTTGTCCA CGGGTGAGGC
· V Q L V E S G G G L V Q P G G S
751 AAGTACAACT GGTGGAGTCT GGAGGAGGTT TGGTGCAACC TGGGGGTTCT
TTCATGTTGA CCACCTCAGA CCTCCTCCAA ACCACGTTGG ACCCCCAAGA
CDR1
L R L S C A A S G F T F S D Y W M ·
801 CTGCGACTCT CTTGTGCAGC CTCGGGATTC ACTTTCAGTG ACTACTGGAT
GACGCTGAGA GAACACGTCG GAGCCCTAAG TGAAAGTCAC TGATGACCTA
CDR1 CDR2
· S W V R Q A P G K G L E W V A D I ·
851 GAGCTGGGTT CGTCAGGCGC CTGGAAAGGG CCTGGAGTGG GTTGCAGATA
CTCGACCCAA GCAGTCCGCG GACCTTTCCC GGACCTCACC CAACGTCTAT

FIG. 2A

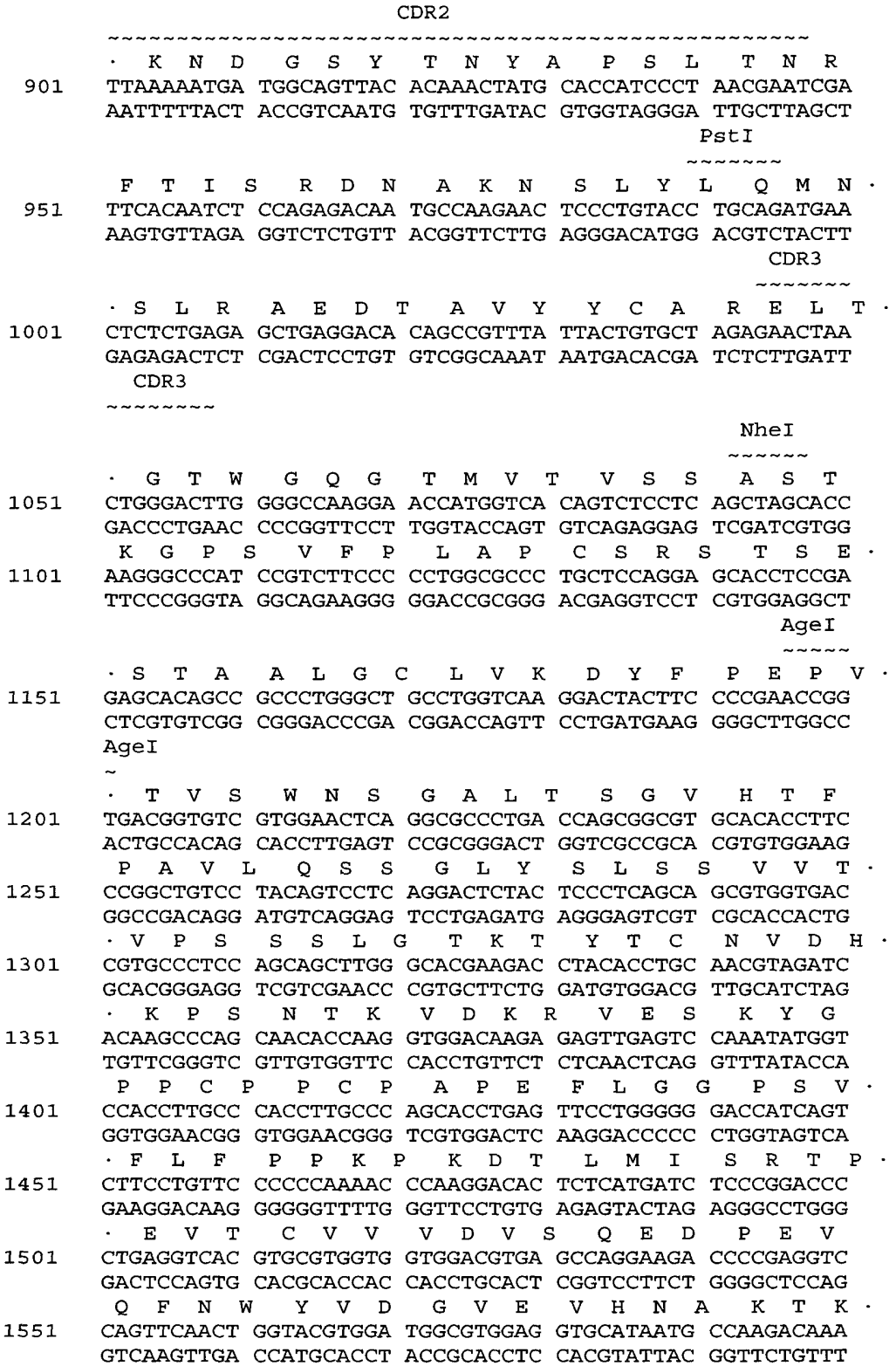
CDR2
· K N D G S Y T N Y A P S L T N R
901 TTAAAAATGA TGGCAGTTAC ACAAACTATG CACCATCCCT AACGAATCGA
AATTTTTACT ACCGTCAATG TGTTTGATAC GTGGTAGGGA TTGCTTAGCT
PstI
F T I S R D N A K N S L Y L Q M N ·
951 TTCACAATCT CCAGAGACAA TGCCAAGAAC TCCCTGTACC TGCAGATGAA
AAGTGTTAGA GGTCTCTGTT ACGGTTCTTG AGGGACATGG ACGTCTACTT
CDR3
· S L R A E D T A V Y Y C A R E L T ·
1001 CTCTCTGAGA GCTGAGGACA CAGCCGTTTA TTACTGTGCT AGAGAACTAA
GAGAGACTCT CGACTCCTGT GTCGGCAAAT AATGACACGA TCTCTTGATT
CDR3
NheI
· G T W G Q G T M V T V S S A S T
1051 CTGGGACTTG GGGCCAAGGA ACCATGGTCA CAGTCTCCTC AGCTAGCACC
GACCCTGAAC CCCGGTTCCT TGGTACCAGT GTCAGAGGAG TCGATCGTGG
K G P S V F P L A P C S R S T S E ·
1101 AAGGGCCCAT CCGTCTTCCC CCTGGCGCCC TGCTCCAGGA GCACCTCCGA
TTCCCGGGTA GGCAGAAGGG GGACCGCGGG ACGAGGTCCT CGTGGAGGCT
AgeI
· S T A A L G C L V K D Y F P E P V ·
1151 GAGCACAGCC GCCCTGGGCT GCCTGGTCAA GGACTACTTC CCCGAACCGG
CTCGTGTCGG CGGGACCCGA CGGACCAGTT CCTGATGAAG GGGCTTGGCC
AgeI
· T V S W N S G A L T S G V H T F
1201 TGACGGTGTC GTGGAACTCA GGCGCCCTGA CCAGCGGCGT GCACACCTTC
ACTGCCACAG CACCTTGAGT CCGCGGGACT GGTCGCCGCA CGTGTGGAAG
P A V L Q S S G L Y S L S S V V T ·
1251 CCGGCTGTCC TACAGTCCTC AGGACTCTAC TCCCTCAGCA GCGTGGTGAC
GGCCGACAGG ATGTCAGGAG TCCTGAGATG AGGGAGTCGT CGCACCACTG
· V P S S S L G T K T Y T C N V D H ·
1301 CGTGCCCTCC AGCAGCTTGG GCACGAAGAC CTACACCTGC AACGTAGATC
GCACGGGAGG TCGTCGAACC CGTGCTTCTG GATGTGGACG TTGCATCTAG
· K P S N T K V D K R V E S K Y G
1351 ACAAGCCCAG CAACACCAAG GTGGACAAGA GAGTTGAGTC CAAATATGGT
TGTTCGGGTC GTTGTGGTTC CACCTGTTCT CTCAACTCAG GTTTATACCA
P P C P P C P A P E F L G G P S V ·
1401 CCACCTTGCC CACCTTGCCC AGCACCTGAG TTCCTGGGGG GACCATCAGT
GGTGGAACGG GTGGAACGGG TCGTGGACTC AAGGACCCCC CTGGTAGTCA
· F L F P P K P K D T L M I S R T P ·
1451 CTTCCTGTTC CCCCCAAAAC CCAAGGACAC TCTCATGATC TCCCGGACCC
GAAGGACAAG GGGGGTTTTG GGTTCCTGTG AGAGTACTAG AGGGCCTGGG
· E V T C V V V D V S Q E D P E V
1501 CTGAGGTCAC GTGCGTGGTG GTGGACGTGA GCCAGGAAGA CCCCGAGGTC
GACTCCAGTG CACGCACCAC CACCTGCACT CGGTCCTTCT GGGGCTCCAG
Q F N W Y V D G V E V H N A K T K ·
1551 CAGTTCAACT GGTACGTGGA TGGCGTGGAG GTGCATAATG CCAAGACAAA
GTCAAGTTGA CCATGCACCT ACCGCACCTC CACGTATTAC GGTTCTGTTT

FIG. 2B

```
          SacII
          ~~~~~~
        · P  R  E   E  Q  F  N   S  T  Y   R  V  V   S  V  L  T ·
1601    GCCGCGGGAG GAGCAGTTCA ACAGCACGTA CCGTGTGGTC AGCGTCCTCA
        CGGCGCCCTC CTCGTCAAGT TGTCGTGCAT GGCACACCAG TCGCAGGAGT
        · V  L  H   Q  D  W   L  N  G  K   E  Y  K   C  K  V
1651    CCGTCCTGCA CCAGGACTGG CTGAACGGCA AGGAGTACAA GTGCAAGGTC
        GGCAGGACGT GGTCCTGACC GACTTGCCGT TCCTCATGTT CACGTTCCAG
         S  N  K  G   L  P  S   S  I  E   K  T  I  S   K  A  K ·
1701    TCCAACAAAG GCCTCCCGTC CTCCATCGAG AAAACCATCT CCAAAGCCAA
        AGGTTGTTTC CGGAGGGCAG GAGGTAGCTC TTTTGGTAGA GGTTTCGGTT
        · G  Q  P   R  E  P  Q   V  Y  T   L  P  P   S  Q  E  E ·
1751    AGGGCAGCCC CGAGAGCCAC AGGTGTACAC CCTGCCCCCA TCCCAGGAGG
        TCCCGTCGGG GCTCTCGGTG TCCACATGTG GGACGGGGGT AGGGTCCTCC
        · M  T  K   N  Q  V   S  L  T  C   L  V  K   G  F  Y
1801    AGATGACCAA GAACCAGGTC AGCCTGACCT GCCTGGTCAA AGGCTTCTAC
        TCTACTGGTT CTTGGTCCAG TCGGACTGGA CGGACCAGTT TCCGAAGATG
         P  S  D  I   A  V  E   W  E  S   N  G  Q  P   E  N  N ·
1851    CCCAGCGACA TCGCCGTGGA GTGGGAGAGC AATGGGCAGC CGGAGAACAA
        GGGTCGCTGT AGCGGCACCT CACCCTCTCG TTACCCGTCG GCCTCTTGTT
        · Y  K  T   T  P  P  V   L  D  S   D  G  S   F  F  L  Y ·
1901    CTACAAGACC ACGCCTCCCG TGCTGGACTC CGACGGCTCC TTCTTCCTCT
        GATGTTCTGG TGCGGAGGGC ACGACCTGAG GCTGCCGAGG AAGAAGGAGA
        · S  R  L   T  V  D   K  S  R  W   Q  E  G   N  V  F
1951    ACAGCAGGCT AACCGTGGAC AAGAGCAGGT GGCAGGAGGG GAATGTCTTC
        TGTCGTCCGA TTGGCACCTG TTCTCGTCCA CCGTCCTCCC CTTACAGAAG
         S  C  S  V   M  H  E   A  L  H   N  H  Y  T   Q  K  S ·
2001    TCATGCTCCG TGATGCATGA GGCTCTGCAC AACCACTACA CACAGAAGAG
        AGTACGAGGC ACTACGTACT CCGAGACGTG TTGGTGATGT GTGTCTTCTC
                                   XbaI
                                   ~~~~~~~
        · L  S  L   S  L  G  K
2051    CCTCTCCCTG TCTCTGGGTA AATGATCTAG AGGGCCCTAT TCTATAGTGT
        GGAGAGGGAC AGAGACCCAT TTACTAGATC TCCCGGGATA AGATATCACA
2101    CACCTAAATG CTAGAGCTCG CTGATCAGCC TCGACTGTGC CTTCTAGTTG
        GTGGATTTAC GATCTCGAGC GACTAGTCGG AGCTGACACG GAAGATCAAC
2151    CCAGCCATCT GTTGTTTGCC CCTCCCCCGT GCCTTCCTTG ACCCTGGAAG
        GGTCGGTAGA CAACAAACGG GGAGGGGGCA CGGAAGGAAC TGGGACCTTC
2201    GTGCCACTCC CACTGTCCTT TCCTAATAAA ATGAGGAAAT TGCATCGCAT
        CACGGTGAGG GTGACAGGAA AGGATTATTT TACTCCTTTA ACGTAGCGTA
2251    TGTCTGAGTA GGTGTCATTC TATTCTGGGG GGTGGGGTGG GGCAGGACAG
        ACAGACTCAT CCACAGTAAG ATAAGACCCC CCACCCCACC CCGTCCTGTC
2301    CAAGGGGGAG GATTGGGAAG ACAATAGCAG GCATGCTGGG GATGCGGTGG
        GTTCCCCCTC CTAACCCTTC TGTTATCGTC CGTACGACCC CTACGCCACC
2351    GCTCTATGGC TTCTGAGGCG GAAAGAACCA GCTGGGGCTC TAGGGGGTAT
        CGAGATACCG AAGACTCCGC CTTTCTTGGT CGACCCCGAG ATCCCCCATA
2401    CCCCACGCGC CCTGTAGCGG CGCATTAAGC GCGGCGGGTG TGGTGGTTAC
        GGGGTGCGCG GGACATCGCC GCGTAATTCG CGCCGCCCAC ACCACCAATG
2451    GCGCAGCGTG ACCGCTACAC TTGCCAGCGC CCTAGCGCCC GCTCCTTTCG
        CGCGTCGCAC TGGCGATGTG AACGGTCGCG GGATCGCGGG CGAGGAAAGC
2501    CTTTCTTCCC TTCCTTTCTC GCCACGTTCG CCGGGCCTCT CAAAAAAGGG
        GAAAGAAGGG AAGGAAAGAG CGGTGCAAGC GGCCCGGAGA GTTTTTTCCC
2551    AAAAAAAGCA TGCATCTCAA TTAGTCAGCA ACCATAGTCC CGCCCCTAAC
        TTTTTTTCGT ACGTAGAGTT AATCAGTCGT TGGTATCAGG GCGGGGATTG
2601    TCCGCCCATC CCGCCCCTAA CTCCGCCCAG TTCCGCCCAT TCTCCGCCCC
        AGGCGGGTAG GGCGGGGATT GAGGCGGGTC AAGGCGGGTA AGAGGCGGGG
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FIG. 2C

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2651   ATGGCTGACT AATTTTTTTT ATTTATGCAG AGGCCGAGGC CGCCTCGGCC
       TACCGACTGA TTAAAAAAAA TAAATACGTC TCCGGCTCCG GCGGAGCCGG
2701   TCTGAGCTAT TCCAGAAGTA GTGAGGAGGC TTTTTTGGAG GCCTAGGCTT
       AGACTCGATA AGGTCTTCAT CACTCCTCCG AAAAAACCTC CGGATCCGAA
2751   TTGCAAAAAG CTTGGACAGC TCAGGGCTGC GATTTCGCGC CAAACTTGAC
       AACGTTTTTC GAACCTGTCG AGTCCCGACG CTAAAGCGCG GTTTGAACTG
2801   GGCAATCCTA GCGTGAAGGC TGGTAGGATT TTATCCCCGC TGCCATCATG
       CCGTTAGGAT CGCACTTCCG ACCATCCTAA AATAGGGGCG ACGGTAGTAC
2851   GTTCGACCAT TGAACTGCAT CGTCGCCGTG TCCCAAAATA TGGGGATTGG
       CAAGCTGGTA ACTTGACGTA GCAGCGGCAC AGGGTTTTAT ACCCCTAACC
2901   CAAGAACGGA GACCTACCCT GGCCTCCGCT CAGGAACGAG TTCAAGTACT
       GTTCTTGCCT CTGGATGGGA CCGGAGGCGA GTCCTTGCTC AAGTTCATGA
2951   TCCAAAGAAT GACCACAACC TCTTCAGTGG AAGGTAAACA GAATCTGGTG
       AGGTTTCTTA CTGGTGTTGG AGAAGTCACC TTCCATTTGT CTTAGACCAC
3001   ATTATGGGTA GGAAAACCTG GTTCTCCATT CCTGAGAAGA ATCGACCTTT
       TAATACCCAT CCTTTTGGAC CAAGAGGTAA GGACTCTTCT TAGCTGGAAA
3051   AAAGGACAGA ATTAATATAG TTCTCAGTAG AGAACTCAAA GAACCACCAC
       TTTCCTGTCT TAATTATATC AAGAGTCATC TCTTGAGTTT CTTGGTGGTG
3101   GAGGAGCTCA TTTTCTTGCC AAAAGTTTGG ATGATGCCTT AAGACTTATT
       CTCCTCGAGT AAAAGAACGG TTTTCAAACC TACTACGGAA TTCTGAATAA
3151   GAACAACCGG AATTGGCAAG TAAAGTAGAC ATGGTTTGGA TAGTCGGAGG
       CTTGTTGGCC TTAACCGTTC ATTTCATCTG TACCAAACCT ATCAGCCTCC
3201   CAGTTCTGTT TACCAGGAAG CCATGAATCA ACCAGGCCAC CTTAGACTCT
       GTCAAGACAA ATGGTCCTTC GGTACTTAGT TGGTCCGGTG GAATCTGAGA
3251   TTGTGACAAG GATCATGCAG GAATTTGAAA GTGACACGTT TTTCCCAGAA
       AACACTGTTC CTAGTACGTC CTTAAACTTT CACTGTGCAA AAAGGGTCTT
3301   ATTGATTTGG GGAAATATAA ACTTCTCCCA GAATACCCAG GCGTCCTCTC
       TAACTAAACC CCTTTATATT TGAAGAGGGT CTTATGGGTC CGCAGGAGAG
3351   TGAGGTCCAG GAGGAAAAAG GCATCAAGTA TAAGTTTGAA GTCTACGAGA
       ACTCCAGGTC CTCCTTTTTC CGTAGTTCAT ATTCAAACTT CAGATGCTCT
3401   AGAAAGACTA ACAGGAAGAT GCTTTCAAGT TCTCTGCTCC CCTCCTAAAG
       TCTTTCTGAT TGTCCTTCTA CGAAAGTTCA AGAGACGAGG GGAGGATTTC
3451   CTATGCATTT TTATAAGACC ATGGGACTTT TGCTGGCTTT AGATCTCTTT
       GATACGTAAA AATATTCTGG TACCCTGAAA ACGACCGAAA TCTAGAGAAA
3501   GTGAAGGAAC CTTACTTCTG TGGTGTGACA TAATTGGACA AACTACCTAC
       CACTTCCTTG GAATGAAGAC ACCACACTGT ATTAACCTGT TTGATGGATG
3551   AGAGATTTAA AGCTCTAAGG TAAATATAAA ATTTTTAAGT GTATAATGTG
       TCTCTAAATT TCGAGATTCC ATTTATATTT TAAAAATTCA CATATTACAC
3601   TTAAACTACT GATTCTAATT GTTTGTGTAT TTTAGATTCC AACCTATGGA
       AATTTGATGA CTAAGATTAA CAAACACATA AAATCTAAGG TTGGATACCT
3651   ACTGATGAAT GGGAGCAGTG GTGGAATGCC TTTAATGAGG AAAACCTGTT
       TGACTACTTA CCCTCGTCAC CACCTTACGG AAATTACTCC TTTTGGACAA
3701   TTGCTCAGAA GAAATGCCAT CTAGTGATGA TGAGGCTACT GCTGACTCTC
       AACGAGTCTT CTTTACGGTA GATCACTACT ACTCCGATGA CGACTGAGAG
3751   AACATTCTAC TCCTCCAAAA AAGAAGAGAA AGGTAGAAGA CCCCAAGGAC
       TTGTAAGATG AGGAGGTTTT TTCTTCTCTT TCCATCTTCT GGGGTTCCTG
3801   TTTCCTTCAG AATTGCTAAG TTTTTTGAGT CATGCTGTGT TTAGTAATAG
       AAAGGAAGTC TTAACGATTC AAAAAACTCA GTACGACACA AATCATTATC
3851   AACTCTTGCT TGCTTTGCTA TTTACACCAC AAAGGAAAAA GCTGCACTGC
       TTGAGAACGA ACGAAACGAT AAATGTGGTG TTTCCTTTTT CGACGTGACG
3901   TATACAAGAA AATTATGGAA AAATATTCTG TAACCTTTAT AAGTAGGCAT
       ATATGTTCTT TTAATACCTT TTTATAAGAC ATTGGAAATA TTCATCCGTA
3951   AACAGTTATA ATCATAACAT ACTGTTTTTT CTTACTCCAC ACAGGCATAG
       TTGTCAATAT TAGTATTGTA TGACAAAAAA GAATGAGGTG TGTCCGTATC
4001   AGTGTCTGCT ATTAATAACT ATGCTCAAAA ATTGTGTACC TTTAGCTTTT
       TCACAGACGA TAATTATTGA TACGAGTTTT TAACACATGG AAATCGAAAA
```

FIG. 2D

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4051  TAATTTGTAA AGGGGTTAAT AAGGAATATT TGATGTATAG TGCCTTGACT
      ATTAAACATT TCCCCAATTA TTCCTTATAA ACTACATATC ACGGAACTGA
4101  AGAGATCATA ATCAGCCATA CCACATTTGT AGAGGTTTTA CTTGCTTTAA
      TCTCTAGTAT TAGTCGGTAT GGTGTAAACA TCTCCAAAAT GAACGAAATT
4151  AAAACCTCCC ACACCTCCCC CTGAACCTGA AACATAAAAT GAATGCAATT
      TTTTGGAGGG TGTGGAGGGG GACTTGGACT TTGTATTTTA CTTACGTTAA
4201  GTTGTTGTTA ACTTGTTTAT TGCAGCTTAT AATGGTTACA AATAAAGCAA
      CAACAACAAT TGAACAAATA ACGTCGAATA TTACCAATGT TTATTTCGTT
4251  TAGCATCACA AATTTCACAA ATAAAGCATT TTTTTCACTG CATTCTAGTT
      ATCGTAGTGT TTAAAGTGTT TATTTCGTAA AAAAAGTGAC GTAAGATCAA
4301  GTGGTTTGTC CAAACTCATC AATGTATCTT ATCATGTCTG GATCGGCTGG
      CACCAAACAG GTTTGAGTAG TTACATAGAA TAGTACAGAC CTAGCCGACC
4351  ATGATCCTCC AGCGCGGGGA TCTCATGCTG GAGTTCTTCG CCCACCCCAA
      TACTAGGAGG TCGCGCCCCT AGAGTACGAC CTCAAGAAGC GGGTGGGGTT
4401  CTTGTTTATT GCAGCTTATA ATGGTTACAA ATAAAGCAAT AGCATCACAA
      GAACAAATAA CGTCGAATAT TACCAATGTT TATTTCGTTA TCGTAGTGTT
4451  ATTTCACAAA TAAAGCATTT TTTTCACTGC ATTCTAGTTG TGGTTTGTCC
      TAAAGTGTTT ATTTCGTAAA AAAAGTGACG TAAGATCAAC ACCAAACAGG
4501  AAACTCATCA ATGTATCTTA TCATGTCTGT ATACCGTCGA CCTCTAGCTA
      TTTGAGTAGT TACATAGAAT AGTACAGACA TATGGCAGCT GGAGATCGAT
4551  GAGCTTGGCG TAATCATGGT CATAGCTGTT TCCTGTGTGA AATTGTTATC
      CTCGAACCGC ATTAGTACCA GTATCGACAA AGGACACACT TTAACAATAG
4601  CGCTCACAAT TCCACACAAC ATACGAGCCG GAAGCATAAA GTGTAAAGCC
      GCGAGTGTTA AGGTGTGTTG TATGCTCGGC CTTCGTATTT CACATTTCGG
4651  TGGGGTGCCT AATGAGTGAG CTAACTCACA TTAATTGCGT TGCGCTCACT
      ACCCCACGGA TTACTCACTC GATTGAGTGT AATTAACGCA ACGCGAGTGA
4701  GCCCGCTTTC CAGTCGGGAA ACCTGTCGTG CCAGCTGCAT TAATGAATCG
      CGGGCGAAAG GTCAGCCCTT TGGACAGCAC GGTCGACGTA ATTACTTAGC
4751  GCCAACGCGC GGGGAGAGGC GGTTTGCGTA TTGGGCGCTC TTCCGCTTCC
      CGGTTGCGCG CCCCTCTCCG CCAAACGCAT AACCCGCGAG AAGGCGAAGG
4801  TCGCTCACTG ACTCGCTGCG CTCGGTCGTT CGGCTGCGGC GAGCGGTATC
      AGCGAGTGAC TGAGCGACGC GAGCCAGCAA GCCGACGCCG CTCGCCATAG
4851  AGCTCACTCA AAGGCGGTAA TACGGTTATC CACAGAATCA GGGGATAACG
      TCGAGTGAGT TTCCGCCATT ATGCCAATAG GTGTCTTAGT CCCCTATTGC
4901  CAGGAAAGAA CATGTGAGCA AAAGGCCAGC AAAAGGCCAG GAACCGTAAA
      GTCCTTTCTT GTACACTCGT TTTCCGGTCG TTTTCCGGTC CTTGGCATTT
4951  AAGGCCGCGT TGCTGGCGTT TTTCCATAGG CTCCGCCCCC CTGACGAGCA
      TTCCGGCGCA ACGACCGCAA AAAGGTATCC GAGGCGGGGG GACTGCTCGT
5001  TCACAAAAAT CGACGCTCAA GTCAGAGGTG GCGAAACCCG ACAGGACTAT
      AGTGTTTTTA GCTGCGAGTT CAGTCTCCAC CGCTTTGGGC TGTCCTGATA
5051  AAAGATACCA GGCGTTTCCC CCTGGAAGCT CCCTCGTGCG CTCTCCTGTT
      TTTCTATGGT CCGCAAAGGG GGACCTTCGA GGGAGCACGC GAGAGGACAA
5101  CCGACCCTGC CGCTTACCGG ATACCTGTCC GCCTTTCTCC CTTCGGGAAG
      GGCTGGGACG GCGAATGGCC TATGGACAGG CGGAAAGAGG GAAGCCCTTC
5151  CGTGGCGCTT TCTCAATGCT CACGCTGTAG GTATCTCAGT TCGGTGTAGG
      GCACCGCGAA AGAGTTACGA GTGCGACATC CATAGAGTCA AGCCACATCC
5201  TCGTTCGCTC CAAGCTGGGC TGTGTGCACG AACCCCCCGT TCAGCCCGAC
      AGCAAGCGAG GTTCGACCCG ACACACGTGC TTGGGGGGCA AGTCGGGCTG
5251  CGCTGCGCCT TATCCGGTAA CTATCGTCTT GAGTCCAACC CGGTAAGACA
      GCGACGCGGA ATAGGCCATT GATAGCAGAA CTCAGGTTGG GCCATTCTGT
5301  CGACTTATCG CCACTGGCAG CAGCCACTGG TAACAGGATT AGCAGAGCGA
      GCTGAATAGC GGTGACCGTC GTCGGTGACC ATTGTCCTAA TCGTCTCGCT
5351  GGTATGTAGG CGGTGCTACA GAGTTCTTGA AGTGGTGGCC TAACTACGGC
      CCATACATCC GCCACGATGT CTCAAGAACT TCACCACCGG ATTGATGCCG
5401  TACACTAGAA GGACAGTATT TGGTATCTGC GCTCTGCTGA AGCCAGTTAC
      ATGTGATCTT CCTGTCATAA ACCATAGACG CGAGACGACT TCGGTCAATG
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FIG. 2E

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5451   CTTCGGAAAA AGAGTTGGTA GCTCTTGATC CGGCAAACAA ACCACCGCTG
       GAAGCCTTTT TCTCAACCAT CGAGAACTAG GCCGTTTGTT TGGTGGCGAC
5501   GTAGCGGTGG TTTTTTTGTT TGCAAGCAGC AGATTACGCG CAGAAAAAAA
       CATCGCCACC AAAAAAACAA ACGTTCGTCG TCTAATGCGC GTCTTTTTTT
5551   GGATCTCAAG AAGATCCTTT GATCTTTTCT ACGGGGTCTG ACGCTCAGTG
       CCTAGAGTTC TTCTAGGAAA CTAGAAAAGA TGCCCCAGAC TGCGAGTCAC
5601   GAACGAAAAC TCACGTTAAG GGATTTTGGT CATGAGATTA TCAAAAAGGA
       CTTGCTTTTG AGTGCAATTC CCTAAAACCA GTACTCTAAT AGTTTTTCCT
5651   TCTTCACCTA GATCCTTTTA AATTAAAAAT GAAGTTTTAA ATCAATCTAA
       AGAAGTGGAT CTAGGAAAAT TTAATTTTTA CTTCAAAATT TAGTTAGATT
5701   AGTATATATG AGTAAACTTG GTCTGACAGT TACCAATGCT TAATCAGTGA
       TCATATATAC TCATTTGAAC CAGACTGTCA ATGGTTACGA ATTAGTCACT
5751   GGCACCTATC TCAGCGATCT GTCTATTTCG TTCATCCATA GTTGCCTGAC
       CCGTGGATAG AGTCGCTAGA CAGATAAAGC AAGTAGGTAT CAACGGACTG
5801   TCCCCGTCGT GTAGATAACT ACGATACGGG AGGGCTTACC ATCTGGCCCC
       AGGGGCAGCA CATCTATTGA TGCTATGCCC TCCCGAATGG TAGACCGGGG
5851   AGTGCTGCAA TGATACCGCG AGACCCACGC TCACCGGCTC CAGATTTATC
       TCACGACGTT ACTATGGCGC TCTGGGTGCG AGTGGCCGAG GTCTAAATAG
5901   AGCAATAAAC CAGCCAGCCG GAAGGGCCGA GCGCAGAAGT GGTCCTGCAA
       TCGTTATTTG GTCGGTCGGC CTTCCCGGCT CGCGTCTTCA CCAGGACGTT
5951   CTTTATCCGC CTCCATCCAG TCTATTAATT GTTGCCGGGA AGCTAGAGTA
       GAAATAGGCG GAGGTAGGTC AGATAATTAA CAACGGCCCT TCGATCTCAT
6001   AGTAGTTCGC CAGTTAATAG TTTGCGCAAC GTTGTTGCCA TTGCTACAGG
       TCATCAAGCG GTCAATTATC AAACGCGTTG CAACAACGGT AACGATGTCC
6051   CATCGTGGTG TCACGCTCGT CGTTTGGTAT GGCTTCATTC AGCTCCGGTT
       GTAGCACCAC AGTGCGAGCA GCAAACCATA CCGAAGTAAG TCGAGGCCAA
6101   CCCAACGATC AAGGCGAGTT ACATGATCCC CCATGTTGTG CAAAAAAGCG
       GGGTTGCTAG TTCCGCTCAA TGTACTAGGG GGTACAACAC GTTTTTTCGC
6151   GTTAGCTCCT TCGGTCCTCC GATCGTTGTC AGAAGTAAGT TGGCCGCAGT
       CAATCGAGGA AGCCAGGAGG CTAGCAACAG TCTTCATTCA ACCGGCGTCA
6201   GTTATCACTC ATGGTTATGG CAGCACTGCA TAATTCTCTT ACTGTCATGC
       CAATAGTGAG TACCAATACC GTCGTGACGT ATTAAGAGAA TGACAGTACG
6251   CATCCGTAAG ATGCTTTTCT GTGACTGGTG AGTACTCAAC CAAGTCATTC
       GTAGGCATTC TACGAAAAGA CACTGACCAC TCATGAGTTG GTTCAGTAAG
6301   TGAGAATAGT GTATGCGGCG ACCGAGTTGC TCTTGCCCGG CGTCAATACG
       ACTCTTATCA CATACGCCGC TGGCTCAACG AGAACGGGCC GCAGTTATGC
6351   GGATAATACC GCGCCACATA GCAGAACTTT AAAAGTGCTC ATCATTGGAA
       CCTATTATGG CGCGGTGTAT CGTCTTGAAA TTTTCACGAG TAGTAACCTT
6401   AACGTTCTTC GGGGCGAAAA CTCTCAAGGA TCTTACCGCT GTTGAGATCC
       TTGCAAGAAG CCCCGCTTTT GAGAGTTCCT AGAATGGCGA CAACTCTAGG
6451   AGTTCGATGT AACCCACTCG TGCACCCAAC TGATCTTCAG CATCTTTTAC
       TCAAGCTACA TTGGGTGAGC ACGTGGGTTG ACTAGAAGTC GTAGAAAATG
6501   TTTCACCAGC GTTTCTGGGT GAGCAAAAAC AGGAAGGCAA AATGCCGCAA
       AAAGTGGTCG CAAAGACCCA CTCGTTTTTG TCCTTCCGTT TTACGGCGTT
6551   AAAAGGGAAT AAGGGCGACA CGGAAATGTT GAATACTCAT ACTCTTCCTT
       TTTTCCCTTA TTCCCGCTGT GCCTTTACAA CTTATGAGTA TGAGAAGGAA
6601   TTTCAATATT ATTGAAGCAT TTATCAGGGT TATTGTCTCA TGAGCGGATA
       AAAGTTATAA TAACTTCGTA AATAGTCCCA ATAACAGAGT ACTCGCCTAT
6651   CATATTTGAA TGTATTTAGA AAAATAAACA AATAGGGGTT CCGCGCACAT
       GTATAAACTT ACATAAATCT TTTTATTTGT TTATCCCCAA GGCGCGTGTA
6701   TTCCCCGAAA AGTGCCACCT GACGTCGACG GATCGGGAGA TCTGCTAGGT
       AAGGGGCTTT TCACGGTGGA CTGCAGCTGC CTAGCCCTCT AGACGATCCA
                AscI
              ~~~~~~~~~
6751   GACCTGAGGC GCGCCGGCTT CGAATAGCCA GAGTAACCTT TTTTTTAAT
       CTGGACTCCG CGCGGCCGAA GCTTATCGGT CTCATTGGAA AAAAAAATTA
```

FIG. 2F

```
6801    TTTATTTTAT TTTATTTTTG AGATGGAGTT TGGCGCCGAT CTCCCGATCC
        AAATAAAATA AAATAAAAAC TCTACCTCAA ACCGCGGCTA GAGGGCTAGG
6851    CCTATGGTCG ACTCTCAGTA CAATCTGCTC TGATGCCGCA TAGTTAAGCC
        GGATACCAGC TGAGAGTCAT GTTAGACGAG ACTACGGCGT ATCAATTCGG
6901    AGTATCTGCT CCCTGCTTGT GTGTTGGAGG TCGCTGAGTA GTGCGCGAGC
        TCATAGACGA GGGACGAACA CACAACCTCC AGCGACTCAT CACGCGCTCG
6951    AAAATTTAAG CTACAACAAG GCAAGGCTTG ACCGACAATT GCATGAAGAA
        TTTTAAATTC GATGTTGTTC CGTTCCGAAC TGGCTGTTAA CGTACTTCTT
7001    TCTGCTTAGG GTTAGGCGTT TTGCGCTGCT TCG
        AGACGAATCC CAATCCGCAA AACGCGACGA AGC
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FIG. 2G

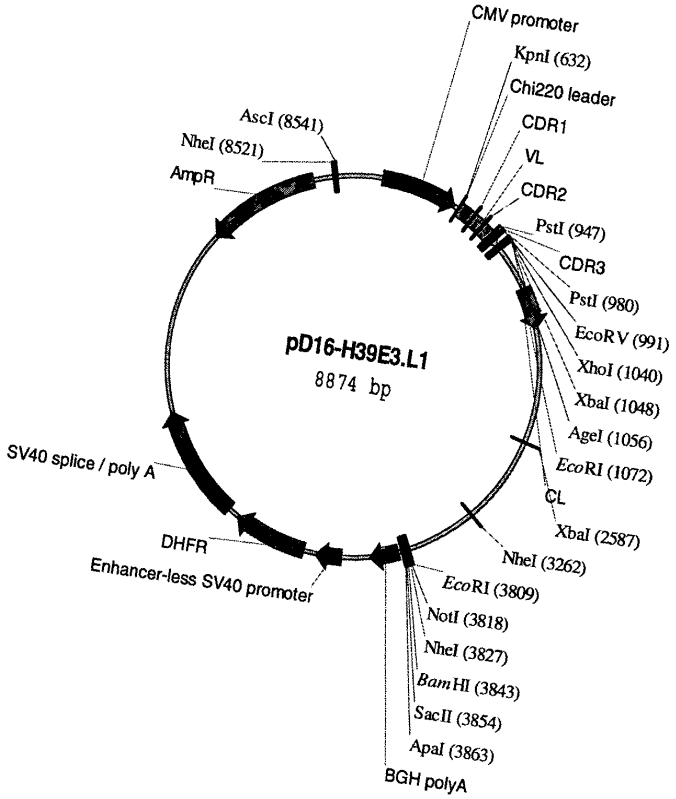
CMV promoter
KpnI (632)
Chi220 leader
CDR1
VL
CDR2
PstI (947)
CDR3
PstI (980)
EcoRV (991)
XhoI (1040)
XbaI (1048)
AgeI (1056)
EcoRI (1072)
CL
XbaI (2587)
NheI (3262)
EcoRI (3809)
NotI (3818)
NheI (3827)
BamHI (3843)
SacII (3854)
ApaI (3863)
BGH polyA
Enhancer-less SV40 promoter
DHFR
SV40 splice / poly A
AmpR
NheI (8521)
AscI (8541)
pD16-H39E3.L1
8874 bp

FIG. 3

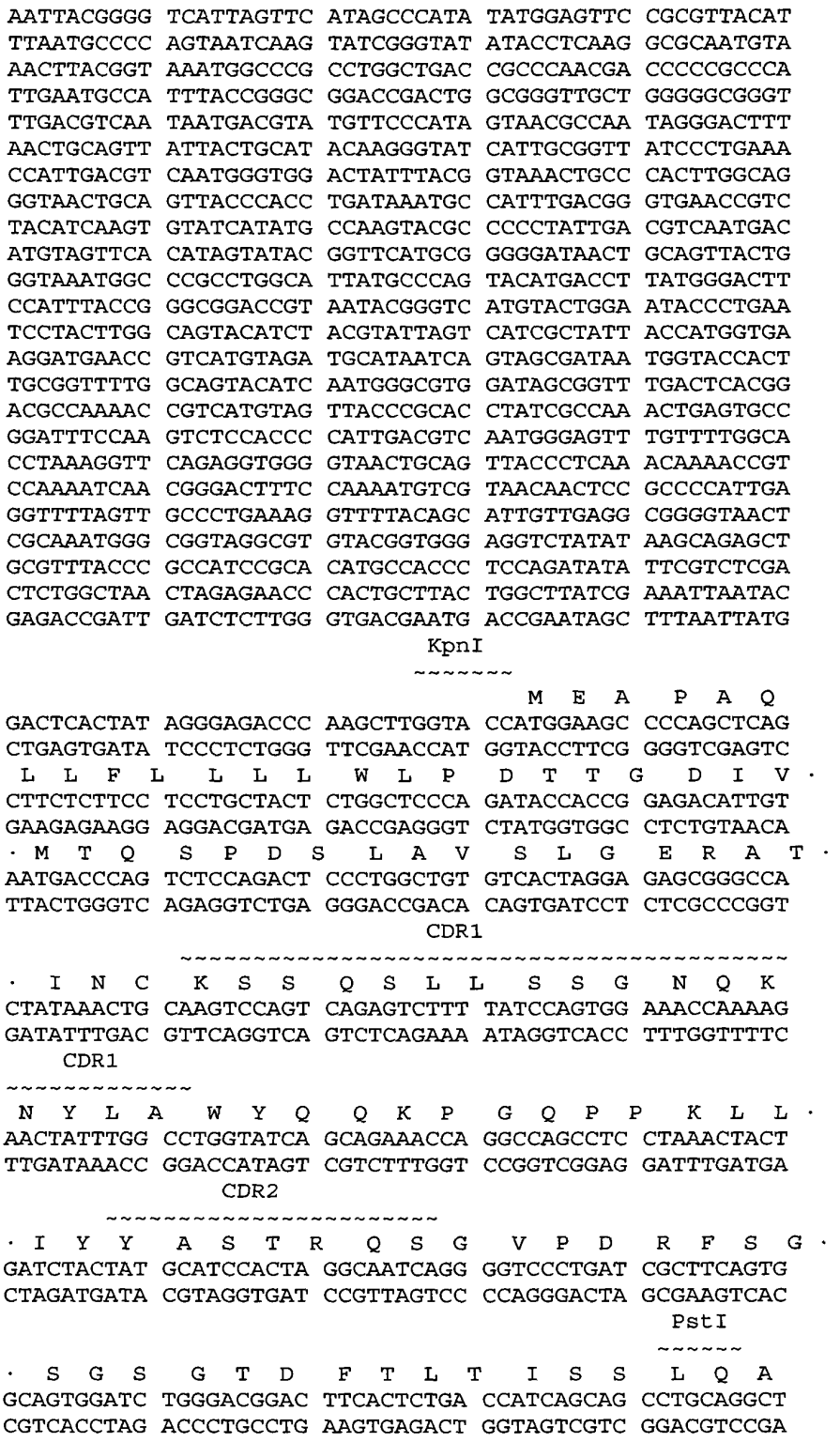
1 AATTACGGGG TCATTAGTTC ATAGCCCATA TATGGAGTTC CGCGTTACAT
TTAATGCCCC AGTAATCAAG TATCGGGTAT ATACCTCAAG GCGCAATGTA
51 AACTTACGGT AAATGGCCCG CCTGGCTGAC CGCCCAACGA CCCCCGCCCA
TTGAATGCCA TTTACCGGGC GGACCGACTG GCGGGTTGCT GGGGGCGGGT
101 TTGACGTCAA TAATGACGTA TGTTCCCATA GTAACGCCAA TAGGGACTTT
AACTGCAGTT ATTACTGCAT ACAAGGGTAT CATTGCGGTT ATCCCTGAAA
151 CCATTGACGT CAATGGGTGG ACTATTTACG GTAAACTGCC CACTTGGCAG
GGTAACTGCA GTTACCCACC TGATAAATGC CATTTGACGG GTGAACCGTC
201 TACATCAAGT GTATCATATG CCAAGTACGC CCCCTATTGA CGTCAATGAC
ATGTAGTTCA CATAGTATAC GGTTCATGCG GGGGATAACT GCAGTTACTG
251 GGTAAATGGC CCGCCTGGCA TTATGCCCAG TACATGACCT TATGGGACTT
CCATTTACCG GGCGGACCGT AATACGGGTC ATGTACTGGA ATACCCTGAA
301 TCCTACTTGG CAGTACATCT ACGTATTAGT CATCGCTATT ACCATGGTGA
AGGATGAACC GTCATGTAGA TGCATAATCA GTAGCGATAA TGGTACCACT
351 TGCGGTTTTG GCAGTACATC AATGGGCGTG GATAGCGGTT TGACTCACGG
ACGCCAAAAC CGTCATGTAG TTACCCGCAC CTATCGCCAA ACTGAGTGCC
401 GGATTTCCAA GTCTCCACCC CATTGACGTC AATGGGAGTT TGTTTTGGCA
CCTAAAGGTT CAGAGGTGGG GTAACTGCAG TTACCCTCAA ACAAAACCGT
451 CCAAAATCAA CGGGACTTTC CAAAATGTCG TAACAACTCC GCCCCATTGA
GGTTTTAGTT GCCCTGAAAG GTTTTACAGC ATTGTTGAGG CGGGGTAACT
501 CGCAAATGGG CGGTAGGCGT GTACGGTGGG AGGTCTATAT AAGCAGAGCT
GCGTTTACCC GCCATCCGCA CATGCCACCC TCCAGATATA TTCGTCTCGA
551 CTCTGGCTAA CTAGAGAACC CACTGCTTAC TGGCTTATCG AAATTAATAC
GAGACCGATT GATCTCTTGG GTGACGAATG ACCGAATAGC TTTAATTATG
KpnI
~~~~~~~
M E A P A Q
601 GACTCACTAT AGGGAGACCC AAGCTTGGTA CCATGGAAGC CCCAGCTCAG
CTGAGTGATA TCCCTCTGGG TTCGAACCAT GGTACCTTCG GGGTCGAGTC
L L F L L L L W L P D T T G D I V ·
651 CTTCTCTTCC TCCTGCTACT CTGGCTCCCA GATACCACCG GAGACATTGT
GAAGAGAAGG AGGACGATGA GACCGAGGGT CTATGGTGGC CTCTGTAACA
· M T Q S P D S L A V S L G E R A T ·
701 AATGACCCAG TCTCCAGACT CCCTGGCTGT GTCACTAGGA GAGCGGGCCA
TTACTGGGTC AGAGGTCTGA GGGACCGACA CAGTGATCCT CTCGCCCGGT
CDR1
~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
· I N C K S S Q S L L S S G N Q K
751 CTATAAACTG CAAGTCCAGT CAGAGTCTTT TATCCAGTGG AAACCAAAAG
GATATTTGAC GTTCAGGTCA GTCTCAGAAA ATAGGTCACC TTTGGTTTTC
CDR1
~~~~~~~~~~~~~~
N Y L A W Y Q Q K P G Q P P K L L ·
801 AACTATTTGG CCTGGTATCA GCAGAAACCA GGCCAGCCTC CTAAACTACT
TTGATAAACC GGACCATAGT CGTCTTTGGT CCGGTCGGAG GATTTGATGA
CDR2
~~~~~~~~~~~~~~~~~~~~~~~~
· I Y Y A S T R Q S G V P D R F S G ·
851 GATCTACTAT GCATCCACTA GGCAATCAGG GGTCCCTGAT CGCTTCAGTG
CTAGATGATA CGTAGGTGAT CCGTTAGTCC CCAGGGACTA GCGAAGTCAC
PstI
~~~~~~
· S G S G T D F T L T I S S L Q A
901 GCAGTGGATC TGGGACGGAC TTCACTCTGA CCATCAGCAG CCTGCAGGCT
CGTCACCTAG ACCCTGCCTG AAGTGAGACT GGTAGTCGTC GGACGTCCGA

FIG. 4A
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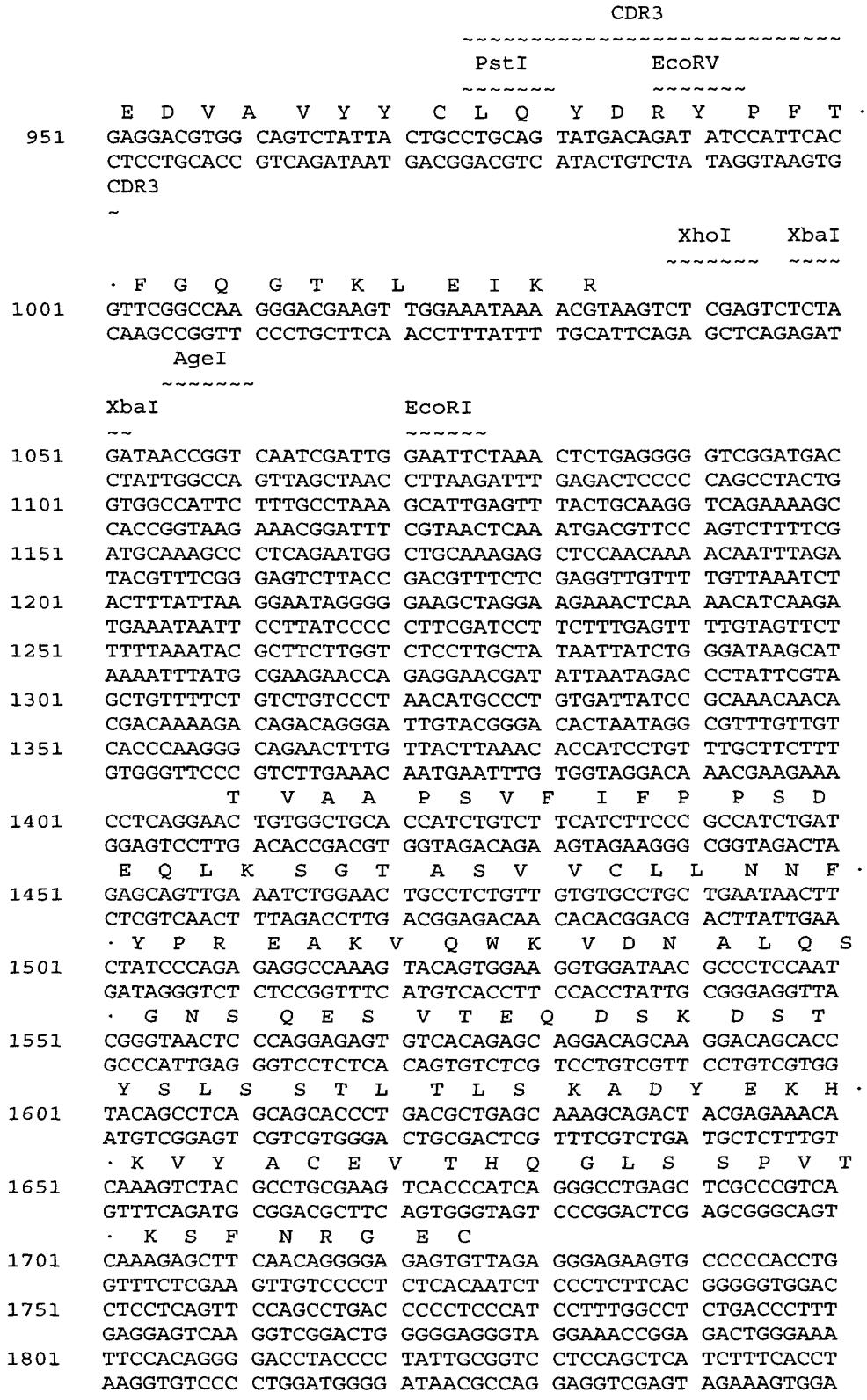


FIG. 4B

```
1851   CACCCCCCTC CTCCTCCTTG GCTTTAATTA TGCTAATGTT GGAGGAGAAT
       GTGGGGGGAG GAGGAGGAAC CGAAATTAAT ACGATTACAA CCTCCTCTTA
1901   GAATAAATAA AGTGAATCTT TGCACCTGTG GTTTCTCTCT TTCCTCATTT
       CTTATTTATT TCACTTAGAA ACGTGGACAC CAAAGAGAGA AAGGAGTAAA
1951   AATAATTATT ATCTGTTGTT TTACCAACTA CTCAATTTCT CTTATAAGGG
       TTATTAATAA TAGACAACAA AATGGTTGAT GAGTTAAAGA GAATATTCCC
2001   ACTAAATATG TAGTCATCCT AAGGCGCATA ACCATTTATA AAAATCATCC
       TGATTTATAC ATCAGTAGGA TTCCGCGTAT TGGTAAATAT TTTTAGTAGG
2051   TTCATTCTAT TTTACCCTAT CATCCTCTGC AAGACAGTCC TCCCTCAAAC
       AAGTAAGATA AAATGGGATA GTAGGAGACG TTCTGTCAGG AGGGAGTTTG
2101   CCACAAGCCT TCTGTCCTCA CAGTCCCCTG GGCCATGGTA GGAGAGACTT
       GGTGTTCGGA AGACAGGAGT GTCAGGGGAC CCGGTACCAT CCTCTCTGAA
2151   GCTTCCTTGT TTTCCCCTCC TCAGCAAGCC CTCATAGTCC TTTTTAAGGG
       CGAAGGAACA AAAGGGGAGG AGTCGTTCGG GAGTATCAGG AAAAATTCCC
2201   TGACAGGTCT TACAGTCATA TATCCTTTGA TTCAATTCCC TGAGAATCAA
       ACTGTCCAGA ATGTCAGTAT ATAGGAAACT AAGTTAAGGG ACTCTTAGTT
2251   CCAAAGCAAA TTTTTCAAAA GAAGAAACCT GCTATAAAGA GAATCATTCA
       GGTTTCGTTT AAAAAGTTTT CTTCTTTGGA CGATATTTCT CTTAGTAAGT
2301   TTGCAACATG ATATAAAATA ACAACACAAT AAAAGCAATT AAATAAACAA
       AACGTTGTAC TATATTTTAT TGTTGTGTTA TTTTCGTTAA TTTATTTGTT
2351   ACAATAGGGA AATGTTTAAG TTCATCATGG TACTTAGACT TAATGGAATG
       TGTTATCCCT TTACAAATTC AAGTAGTACC ATGAATCTGA ATTACCTTAC
2401   TCATGCCTTA TTTACATTTT TAAACAGGTA CTGAGGGACT CCTGTCTGCC
       AGTACGGAAT AAATGTAAAA ATTTGTCCAT GACTCCCTGA GGACAGACGG
2451   AAGGGCCGTA TTGAGTACTT TCCACAACCT AATTTAATCC ACACTATACT
       TTCCCGGCAT AACTCATGAA AGGTGTTGGA TTAAATTAGG TGTGATATGA
2501   GTGAGATTAA AAACATTCAT TAAAATGTTG CAAAGGTTCT ATAAAGCTGA
       CACTCTAATT TTTGTAAGTA ATTTTACAAC GTTTCCAAGA TATTTCGACT
                                          XbaI
                                          ~~~~~~~
2551   GAGACAAATA TATTCTATAA CTCAGCAATC CCACTTCTAG ATGACTGAGT
       CTCTGTTTAT ATAAGATATT GAGTCGTTAG GGTGAAGATC TACTGACTCA
2601   GTCCCCACCC ACCAAAAAAC TATGCAAGAA TGTTCAAAGC AGCTTTATTT
       CAGGGGTGGG TGGTTTTTTG ATACGTTCTT ACAAGTTTCG TCGAAATAAA
2651   ACAAAAGCCA AAAATTGGAA ATAGCCCGAT TGTCCAACAA TAGAATGAGT
       TGTTTTCGGT TTTTAACCTT TATCGGGCTA ACAGGTTGTT ATCTTACTCA
2701   TATTAAACTG TGGTATGTTT ATACATTAGA ATACCCAATG AGGAGAATTA
       ATAATTTGAC ACCATACAAA TATGTAATCT TATGGGTTAC TCCTCTTAAT
2751   ACAAGCTACA ACTATACCTA CTCACACAGA TGAATCTCAT AAAAATAATG
       TGTTCGATGT TGATATGGAT GAGTGTGTCT ACTTAGAGTA TTTTTATTAC
2801   TTACATAAGA GAAACTCAAT GCAAAAGATA TGTTCTGTAT GTTTTCATCC
       AATGTATTCT CTTTGAGTTA CGTTTTCTAT ACAAGACATA CAAAAGTAGG
2851   ATATAAAGTT CAAAACCAGG TAAAAATAAA GTTAGAAATT TGGATGGAAA
       TATATTTCAA GTTTTGGTCC ATTTTTATTT CAATCTTTAA ACCTACCTTT
2901   TTACTCTTAG CTGGGGGTGG GCGAGTTAGT GCCTGGGAGA AGACAAGAAG
       AATGAGAATC GACCCCCACC CGCTCAATCA CGGACCCTCT TCTGTTCTTC
2951   GGGCTTCTGG GGTCTTGGTA ATGTTCTGTT CCTCGTGTGG GGTTGTGCAG
       CCCGAAGACC CCAGAACCAT TACAAGACAA GGAGCACACC CCAACACGTC
3001   TTATGATCTG TGCACTGTTC TGTATACACA TTATGCTTCA AAATAACTTC
       AATACTAGAC ACGTGACAAG ACATATGTGT AATACGAAGT TTTATTGAAG
3051   ACATAAAGAA CATCTTATAC CCAGTTAATA GATAGAAGAG GAATAAGTAA
       TGTATTTCTT GTAGAATATG GGTCAATTAT CTATCTTCTC CTTATTCATT
3101   TAGGTCAAGA CCACGCAGCT GGTAAGTGGG GGGGCCTGGG ATCAAATAGC
       ATCCAGTTCT GGTGCGTCGA CCATTCACCC CCCCGGACCC TAGTTTATCG
3151   TACCTGCCTA ATCCTGCCCT CTTGAGCCCT GAATGAGTCT GCCTTCCAGG
       ATGGACGGAT TAGGACGGGA GAACTCGGGA CTTACTCAGA CGGAAGGTCC
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FIG. 4C

```
3201   GCTCAAGGTG CTCAACAAAA CAACAGGCCT GCTATTTTCC TGGCATCTGT
       CGAGTTCCAC GAGTTGTTTT GTTGTCCGGA CGATAAAAGG ACCGTAGACA
                  NheI
                  ~~~~~~
3251   GCCCTGTTTG GCTAGCTAGG AGCACACATA CATAGAAATT AAATGAAACA
       CGGGACAAAC CGATCGATCC TCGTGTGTAT GTATCTTTAA TTTACTTTGT
3301   GACCTTCAGC AAGGGGACAG AGGACAGAAT TAACCTTGCC CAGACACTGG
       CTGGAAGTCG TTCCCCTGTC TCCTGTCTTA ATTGGAACGG GTCTGTGACC
3351   AAACCCATGT ATGAACACTC ACATGTTTGG GAAGGGGGAA GGGCACATGT
       TTTGGGTACA TACTTGTGAG TGTACAAACC CTTCCCCCTT CCCGTGTACA
3401   AAATGAGGAC TCTTCCTCAT TCTATGGGGC ACTCTGGCCC TGCCCCTCTC
       TTTACTCCTG AGAAGGAGTA AGATACCCCG TGAGACCGGG ACGGGGAGAG
3451   AGCTACTCAT CCATCCAACA CACCTTTCTA AGTACCTCTC TCTGCCTACA
       TCGATGAGTA GGTAGGTTGT GTGGAAAGAT TCATGGAGAG AGACGGATGT
3501   CTCTGAAGGG GTTCAGGAGT AACTAACACA GCATCCCTTC CCTCAAATGA
       GAGACTTCCC CAAGTCCTCA TTGATTGTGT CGTAGGGAAG GGAGTTTACT
3551   CTGACAATCC CTTTGTCCTG CTTTGTTTTT CTTTCCAGTC AGTACTGGGA
       GACTGTTAGG GAAACAGGAC GAAACAAAAA GAAAGGTCAG TCATGACCCT
3601   AAGTGGGGAA GGACAGTCAT GGAGAAACTA CATAAGGAAG CACCTTGCCC
       TTCACCCCTT CCTGTCAGTA CCTCTTTGAT GTATTCCTTC GTGGAACGGG
3651   TTCTGCCTCT TGAGAATGTT GATGAGTATC AAATCTTTCA AACTTTGGAG
       AAGACGGAGA ACTCTTACAA CTACTCATAG TTTAGAAAGT TTGAAACCTC
3701   GTTTGAGTAG GGGTGAGACT CAGTAATGTC CCTTCCAATG ACATGAACTT
       CAAACTCATC CCCACTCTGA GTCATTACAG GGAAGGTTAC TGTACTTGAA
3751   GCTCACTCAT CCCTGGGGGC CAAATTGAAC AATCAAAGGC AGGCATAATC
       CGAGTGAGTA GGGACCCCCG GTTTAACTTG TTAGTTTCCG TCCGTATTAG
                                                        SacII
                                                        ~
              EcoRI       NotI       NheI              BamHI
              ~~~~~~~   ~~~~~~~~~   ~~~~~~~            ~~~~~~
3801   CAGTTATGAA TTCTTGCGGC CGCTTGCTAG CTTCACGTGT TGGATCCAAC
       GTCAATACTT AAGAACGCCG GCGAACGATC GAAGTGCACA ACCTAGGTTG
       SacII   ApaI
       ~~~~~  ~~~~~~~
3851   CGCGGAAGGG CCCTATTCTA TAGTGTCACC TAAATGCTAG AGCTCGCTGA
       GCGCCTTCCC GGGATAAGAT ATCACAGTGG ATTTACGATC TCGAGCGACT
3901   TCAGCCTCGA CTGTGCCTTC TAGTTGCCAG CCATCTGTTG TTTGCCCCTC
       AGTCGGAGCT GACACGGAAG ATCAACGGTC GGTAGACAAC AAACGGGGAG
3951   CCCCGTGCCT TCCTTGACCC TGGAAGGTGC CACTCCCACT GTCCTTTCCT
       GGGGCACGGA AGGAACTGGG ACCTTCCACG GTGAGGGTGA CAGGAAAGGA
4001   AATAAAATGA GGAAATTGCA TCGCATTGTC TGAGTAGGTG TCATTCTATT
       TTATTTTACT CCTTTAACGT AGCGTAACAG ACTCATCCAC AGTAAGATAA
4051   CTGGGGGGTG GGGTGGGGCA GGACAGCAAG GGGGAGGATT GGGAAGACAA
       GACCCCCCAC CCCACCCCGT CCTGTCGTTC CCCCTCCTAA CCCTTCTGTT
4101   TAGCAGGCAT GCTGGGGATG CGGTGGGCTC TATGGCTTCT GAGGCGGAAA
       ATCGTCCGTA CGACCCCTAC GCCACCCGAG ATACCGAAGA CTCCGCCTTT
4151   GAACCAGCTG GGGCTCTAGG GGGTATCCCC ACGCGCCCTG TAGCGGCGCA
       CTTGGTCGAC CCCGAGATCC CCCATAGGGG TGCGCGGGAC ATCGCCGCGT
4201   TTAAGCGCGG CGGGTGTGGT GGTTACGCGC AGCGTGACCG CTACACTTGC
       AATTCGCGCC GCCCACACCA CCAATGCGCG TCGCACTGGC GATGTGAACG
4251   CAGCGCCCTA GCGCCCGCTC CTTTCGCTTT CTTCCCTTCC TTTCTCGCCA
       GTCGCGGGAT CGCGGGCGAG GAAAGCGAAA GAAGGGAAGG AAAGAGCGGT
4301   CGTTCGCCGG GCCTCTCAAA AAAGGGAAAA AAAGCATGCA TCTCAATTAG
       GCAAGCGGCC CGGAGAGTTT TTTCCCTTTT TTTCGTACGT AGAGTTAATC
4351   TCAGCAACCA TAGTCCCGCC CCTAACTCCG CCCATCCCGC CCCTAACTCC
       AGTCGTTGGT ATCAGGGCGG GGATTGAGGC GGGTAGGGCG GGGATTGAGG
```

FIG. 4D

```
4401   GCCCAGTTCC GCCCATTCTC CGCCCCATGG CTGACTAATT TTTTTTATTT
       CGGGTCAAGG CGGGTAAGAG GCGGGGTACC GACTGATTAA AAAAAATAAA
4451   ATGCAGAGGC CGAGGCCGCC TCGGCCTCTG AGCTATTCCA GAAGTAGTGA
       TACGTCTCCG GCTCCGGCGG AGCCGGAGAC TCGATAAGGT CTTCATCACT
4501   GGAGGCTTTT TTGGAGGCCT AGGCTTTTGC AAAAAGCTTG GACAGCTCAG
       CCTCCGAAAA AACCTCCGGA TCCGAAAACG TTTTTCGAAC CTGTCGAGTC
4551   GGCTGCGATT TCGCGCCAAA CTTGACGGCA ATCCTAGCGT GAAGGCTGGT
       CCGACGCTAA AGCGCGGTTT GAACTGCCGT TAGGATCGCA CTTCCGACCA
4601   AGGATTTTAT CCCCGCTGCC ATCATGGTTC GACCATTGAA CTGCATCGTC
       TCCTAAAATA GGGGCGACGG TAGTACCAAG CTGGTAACTT GACGTAGCAG
4651   GCCGTGTCCC AAAATATGGG GATTGGCAAG AACGGAGACC TACCCTGGCC
       CGGCACAGGG TTTTATACCC CTAACCGTTC TTGCCTCTGG ATGGGACCGG
4701   TCCGCTCAGG AACGAGTTCA AGTACTTCCA AAGAATGACC ACAACCTCTT
       AGGCGAGTCC TTGCTCAAGT TCATGAAGGT TTCTTACTGG TGTTGGAGAA
4751   CAGTGGAAGG TAAACAGAAT CTGGTGATTA TGGGTAGGAA AACCTGGTTC
       GTCACCTTCC ATTTGTCTTA GACCACTAAT ACCCATCCTT TTGGACCAAG
4801   TCCATTCCTG AGAAGAATCG ACCTTTAAAG GACAGAATTA ATATAGTTCT
       AGGTAAGGAC TCTTCTTAGC TGGAAATTTC CTGTCTTAAT TATATCAAGA
4851   CAGTAGAGAA CTCAAAGAAC CACCACGAGG AGCTCATTTT CTTGCCAAAA
       GTCATCTCTT GAGTTTCTTG GTGGTGCTCC TCGAGTAAAA GAACGGTTTT
4901   GTTTGGATGA TGCCTTAAGA CTTATTGAAC AACCGGAATT GGCAAGTAAA
       CAAACCTACT ACGGAATTCT GAATAACTTG TTGGCCTTAA CCGTTCATTT
4951   GTAGACATGG TTTGGATAGT CGGAGGCAGT TCTGTTTACC AGGAAGCCAT
       CATCTGTACC AAACCTATCA GCCTCCGTCA AGACAAATGG TCCTTCGGTA
5001   GAATCAACCA GGCCACCTTA GACTCTTTGT GACAAGGATC ATGCAGGAAT
       CTTAGTTGGT CCGGTGGAAT CTGAGAAACA CTGTTCCTAG TACGTCCTTA
5051   TTGAAAGTGA CACGTTTTTC CCAGAAATTG ATTTGGGGAA ATATAAACTT
       AACTTTCACT GTGCAAAAAG GGTCTTTAAC TAAACCCCTT TATATTTGAA
5101   CTCCCAGAAT ACCCAGGCGT CCTCTCTGAG GTCCAGGAGG AAAAAGGCAT
       GAGGGTCTTA TGGGTCCGCA GGAGAGACTC CAGGTCCTCC TTTTTCCGTA
5151   CAAGTATAAG TTTGAAGTCT ACGAGAAGAA AGACTAACAG GAAGATGCTT
       GTTCATATTC AAACTTCAGA TGCTCTTCTT TCTGATTGTC CTTCTACGAA
5201   TCAAGTTCTC TGCTCCCCTC CTAAAGCTAT GCATTTTTAT AAGACCATGG
       AGTTCAAGAG ACGAGGGGAG GATTTCGATA CGTAAAAATA TTCTGGTACC
5251   GACTTTTGCT GGCTTTAGAT CTCTTTGTGA AGGAACCTTA CTTCTGTGGT
       CTGAAAACGA CCGAAATCTA GAGAAACACT TCCTTGGAAT GAAGACACCA
5301   GTGACATAAT TGGACAAACT ACCTACAGAG ATTTAAAGCT CTAAGGTAAA
       CACTGTATTA ACCTGTTTGA TGGATGTCTC TAAATTTCGA GATTCCATTT
5351   TATAAAATTT TTAAGTGTAT AATGTGTTAA ACTACTGATT CTAATTGTTT
       ATATTTTAAA AATTCACATA TTACACAATT TGATGACTAA GATTAACAAA
5401   GTGTATTTTA GATTCCAACC TATGGAACTG ATGAATGGGA GCAGTGGTGG
       CACATAAAAT CTAAGGTTGG ATACCTTGAC TACTTACCCT CGTCACCACC
5451   AATGCCTTTA ATGAGGAAAA CCTGTTTTGC TCAGAAGAAA TGCCATCTAG
       TTACGGAAAT TACTCCTTTT GGACAAAACG AGTCTTCTTT ACGGTAGATC
5501   TGATGATGAG GCTACTGCTG ACTCTCAACA TTCTACTCCT CCAAAAAAGA
       ACTACTACTC CGATGACGAC TGAGAGTTGT AAGATGAGGA GGTTTTTTCT
5551   AGAGAAAGGT AGAAGACCCC AAGGACTTTC CTTCAGAATT GCTAAGTTTT
       TCTCTTTCCA TCTTCTGGGG TTCCTGAAAG GAAGTCTTAA CGATTCAAAA
5601   TTGAGTCATG CTGTGTTTAG TAATAGAACT CTTGCTTGCT TTGCTATTTA
       AACTCAGTAC GACACAAATC ATTATCTTGA GAACGAACGA AACGATAAAT
5651   CACCACAAAG GAAAAAGCTG CACTGCTATA CAAGAAAATT ATGGAAAAAT
       GTGGTGTTTC CTTTTTCGAC GTGACGATAT GTTCTTTTAA TACCTTTTTA
5701   ATTCTGTAAC CTTTATAAGT AGGCATAACA GTTATAATCA TAACATACTG
       TAAGACATTG GAAATATTCA TCCGTATTGT CAATATTAGT ATTGTATGAC
5751   TTTTTTCTTA CTCCACACAG GCATAGAGTG TCTGCTATTA ATAACTATGC
       AAAAAAGAAT GAGGTGTGTC CGTATCTCAC AGACGATAAT TATTGATACG
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FIG. 4E

```
5801    TCAAAAATTG TGTACCTTTA GCTTTTTAAT TTGTAAAGGG GTTAATAAGG
        AGTTTTTAAC ACATGGAAAT CGAAAAATTA AACATTTCCC CAATTATTCC
5851    AATATTTGAT GTATAGTGCC TTGACTAGAG ATCATAATCA GCCATACCAC
        TTATAAACTA CATATCACGG AACTGATCTC TAGTATTAGT CGGTATGGTG
5901    ATTTGTAGAG GTTTTACTTG CTTTAAAAAA CCTCCCACAC CTCCCCCTGA
        TAAACATCTC CAAAATGAAC GAAATTTTTT GGAGGGTGTG GAGGGGGACT
5951    ACCTGAAACA TAAAATGAAT GCAATTGTTG TTGTTAACTT GTTTATTGCA
        TGGACTTTGT ATTTTACTTA CGTTAACAAC AACAATTGAA CAAATAACGT
6001    GCTTATAATG GTTACAAATA AAGCAATAGC ATCACAAATT TCACAAATAA
        CGAATATTAC CAATGTTTAT TTCGTTATCG TAGTGTTTAA AGTGTTTATT
6051    AGCATTTTTT TCACTGCATT CTAGTTGTGG TTTGTCCAAA CTCATCAATG
        TCGTAAAAAA AGTGACGTAA GATCAACACC AAACAGGTTT GAGTAGTTAC
6101    TATCTTATCA TGTCTGGATC GGCTGGATGA TCCTCCAGCG CGGGGATCTC
        ATAGAATAGT ACAGACCTAG CCGACCTACT AGGAGGTCGC GCCCCTAGAG
6151    ATGCTGGAGT TCTTCGCCCA CCCCAACTTG TTTATTGCAG CTTATAATGG
        TACGACCTCA AGAAGCGGGT GGGGTTGAAC AAATAACGTC GAATATTACC
6201    TTACAAATAA AGCAATAGCA TCACAAATTT CACAAATAAA GCATTTTTTT
        AATGTTTATT TCGTTATCGT AGTGTTTAAA GTGTTTATTT CGTAAAAAAA
6251    CACTGCATTC TAGTTGTGGT TTGTCCAAAC TCATCAATGT ATCTTATCAT
        GTGACGTAAG ATCAACACCA AACAGGTTTG AGTAGTTACA TAGAATAGTA
6301    GTCTGTATAC CGTCGACCTC TAGCTAGAGC TTGGCGTAAT CATGGTCATA
        CAGACATATG GCAGCTGGAG ATCGATCTCG AACCGCATTA GTACCAGTAT
6351    GCTGTTTCCT GTGTGAAATT GTTATCCGCT CACAATTCCA CACAACATAC
        CGACAAAGGA CACACTTTAA CAATAGGCGA GTGTTAAGGT GTGTTGTATG
6401    GAGCCGGAAG CATAAAGTGT AAAGCCTGGG GTGCCTAATG AGTGAGCTAA
        CTCGGCCTTC GTATTTCACA TTTCGGACCC CACGGATTAC TCACTCGATT
6451    CTCACATTAA TTGCGTTGCG CTCACTGCCC GCTTTCCAGT CGGGAAACCT
        GAGTGTAATT AACGCAACGC GAGTGACGGG CGAAAGGTCA GCCCTTTGGA
6501    GTCGTGCCAG CTGCATTAAT GAATCGGCCA ACGCGCGGGG AGAGGCGGTT
        CAGCACGGTC GACGTAATTA CTTAGCCGGT TGCGCGCCCC TCTCCGCCAA
6551    TGCGTATTGG GCGCTCTTCC GCTTCCTCGC TCACTGACTC GCTGCGCTCG
        ACGCATAACC CGCGAGAAGG CGAAGGAGCG AGTGACTGAG CGACGCGAGC
6601    GTCGTTCGGC TGCGGCGAGC GGTATCAGCT CACTCAAAGG CGGTAATACG
        CAGCAAGCCG ACGCCGCTCG CCATAGTCGA GTGAGTTTCC GCCATTATGC
6651    GTTATCCACA GAATCAGGGG ATAACGCAGG AAAGAACATG TGAGCAAAAG
        CAATAGGTGT CTTAGTCCCC TATTGCGTCC TTTCTTGTAC ACTCGTTTTC
6701    GCCAGCAAAA GGCCAGGAAC CGTAAAAAGG CCGCGTTGCT GGCGTTTTTC
        CGGTCGTTTT CCGGTCCTTG GCATTTTTCC GGCGCAACGA CCGCAAAAAG
6751    CATAGGCTCC GCCCCCCTGA CGAGCATCAC AAAAATCGAC GCTCAAGTCA
        GTATCCGAGG CGGGGGGACT GCTCGTAGTG TTTTTAGCTG CGAGTTCAGT
6801    GAGGTGGCGA AACCCGACAG GACTATAAAG ATACCAGGCG TTTCCCCCTG
        CTCCACCGCT TTGGGCTGTC CTGATATTTC TATGGTCCGC AAAGGGGGAC
6851    GAAGCTCCCT CGTGCGCTCT CCTGTTCCGA CCCTGCCGCT TACCGGATAC
        CTTCGAGGGA GCACGCGAGA GGACAAGGCT GGGACGGCGA ATGGCCTATG
6901    CTGTCCGCCT TTCTCCCTTC GGGAAGCGTG GCGCTTTCTC AATGCTCACG
        GACAGGCGGA AAGAGGGAAG CCCTTCGCAC CGCGAAAGAG TTACGAGTGC
6951    CTGTAGGTAT CTCAGTTCGG TGTAGGTCGT TCGCTCCAAG CTGGGCTGTG
        GACATCCATA GAGTCAAGCC ACATCCAGCA AGCGAGGTTC GACCCGACAC
7001    TGCACGAACC CCCCGTTCAG CCCGACCGCT GCGCCTTATC CGGTAACTAT
        ACGTGCTTGG GGGGCAAGTC GGGCTGGCGA CGCGGAATAG GCCATTGATA
7051    CGTCTTGAGT CCAACCCGGT AAGACACGAC TTATCGCCAC TGGCAGCAGC
        GCAGAACTCA GGTTGGGCCA TTCTGTGCTG AATAGCGGTG ACCGTCGTCG
7101    CACTGGTAAC AGGATTAGCA GAGCGAGGTA TGTAGGCGGT GCTACAGAGT
        GTGACCATTG TCCTAATCGT CTCGCTCCAT ACATCCGCCA CGATGTCTCA
7151    TCTTGAAGTG GTGGCCTAAC TACGGCTACA CTAGAAGGAC AGTATTTGGT
        AGAACTTCAC CACCGGATTG ATGCCGATGT GATCTTCCTG TCATAAACCA
```

FIG. 4F

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7201    ATCTGCGCTC TGCTGAAGCC AGTTACCTTC GGAAAAAGAG TTGGTAGCTC
        TAGACGCGAG ACGACTTCGG TCAATGGAAG CCTTTTTCTC AACCATCGAG
7251    TTGATCCGGC AAACAAACCA CCGCTGGTAG CGGTGGTTTT TTTGTTTGCA
        AACTAGGCCG TTTGTTTGGT GGCGACCATC GCCACCAAAA AAACAAACGT
7301    AGCAGCAGAT TACGCGCAGA AAAAAAGGAT CTCAAGAAGA TCCTTTGATC
        TCGTCGTCTA ATGCGCGTCT TTTTTTCCTA GAGTTCTTCT AGGAAACTAG
7351    TTTTCTACGG GGTCTGACGC TCAGTGGAAC GAAAACTCAC GTTAAGGGAT
        AAAAGATGCC CCAGACTGCG AGTCACCTTG CTTTTGAGTG CAATTCCCTA
7401    TTTGGTCATG AGATTATCAA AAAGGATCTT CACCTAGATC CTTTTAAATT
        AAACCAGTAC TCTAATAGTT TTTCCTAGAA GTGGATCTAG GAAAATTTAA
7451    AAAAATGAAG TTTTAAATCA ATCTAAAGTA TATATGAGTA AACTTGGTCT
        TTTTTACTTC AAAATTTAGT TAGATTTCAT ATATACTCAT TTGAACCAGA
7501    GACAGTTACC AATGCTTAAT CAGTGAGGCA CCTATCTCAG CGATCTGTCT
        CTGTCAATGG TTACGAATTA GTCACTCCGT GGATAGAGTC GCTAGACAGA
7551    ATTTCGTTCA TCCATAGTTG CCTGACTCCC CGTCGTGTAG ATAACTACGA
        TAAAGCAAGT AGGTATCAAC GGACTGAGGG GCAGCACATC TATTGATGCT
7601    TACGGGAGGG CTTACCATCT GGCCCCAGTG CTGCAATGAT ACCGCGAGAC
        ATGCCCTCCC GAATGGTAGA CCGGGGTCAC GACGTTACTA TGGCGCTCTG
7651    CCACGCTCAC CGGCTCCAGA TTTATCAGCA ATAAACCAGC CAGCCGGAAG
        GGTGCGAGTG GCCGAGGTCT AAATAGTCGT TATTTGGTCG GTCGGCCTTC
7701    GGCCGAGCGC AGAAGTGGTC CTGCAACTTT ATCCGCCTCC ATCCAGTCTA
        CCGGCTCGCG TCTTCACCAG GACGTTGAAA TAGGCGGAGG TAGGTCAGAT
7751    TTAATTGTTG CCGGGAAGCT AGAGTAAGTA GTTCGCCAGT TAATAGTTTG
        AATTAACAAC GGCCCTTCGA TCTCATTCAT CAAGCGGTCA ATTATCAAAC
7801    CGCAACGTTG TTGCCATTGC TACAGGCATC GTGGTGTCAC GCTCGTCGTT
        GCGTTGCAAC AACGGTAACG ATGTCCGTAG CACCACAGTG CGAGCAGCAA
7851    TGGTATGGCT TCATTCAGCT CCGGTTCCCA ACGATCAAGG CGAGTTACAT
        ACCATACCGA AGTAAGTCGA GGCCAAGGGT TGCTAGTTCC GCTCAATGTA
7901    GATCCCCCAT GTTGTGCAAA AAAGCGGTTA GCTCCTTCGG TCCTCCGATC
        CTAGGGGGTA CAACACGTTT TTTCGCCAAT CGAGGAAGCC AGGAGGCTAG
7951    GTTGTCAGAA GTAAGTTGGC CGCAGTGTTA TCACTCATGG TTATGGCAGC
        CAACAGTCTT CATTCAACCG GCGTCACAAT AGTGAGTACC AATACCGTCG
8001    ACTGCATAAT TCTCTTACTG TCATGCCATC CGTAAGATGC TTTTCTGTGA
        TGACGTATTA AGAGAATGAC AGTACGGTAG GCATTCTACG AAAAGACACT
8051    CTGGTGAGTA CTCAACCAAG TCATTCTGAG AATAGTGTAT GCGGCGACCG
        GACCACTCAT GAGTTGGTTC AGTAAGACTC TTATCACATA CGCCGCTGGC
8101    AGTTGCTCTT GCCCGGCGTC AATACGGGAT AATACCGCGC CACATAGCAG
        TCAACGAGAA CGGGCCGCAG TTATGCCCTA TTATGGCGCG GTGTATCGTC
8151    AACTTTAAAA GTGCTCATCA TTGGAAAACG TTCTTCGGGG CGAAAACTCT
        TTGAAATTTT CACGAGTAGT AACCTTTTGC AAGAAGCCCC GCTTTTGAGA
8201    CAAGGATCTT ACCGCTGTTG AGATCCAGTT CGATGTAACC CACTCGTGCA
        GTTCCTAGAA TGGCGACAAC TCTAGGTCAA GCTACATTGG GTGAGCACGT
8251    CCCAACTGAT CTTCAGCATC TTTTACTTTC ACCAGCGTTT CTGGGTGAGC
        GGGTTGACTA GAAGTCGTAG AAAATGAAAG TGGTCGCAAA GACCCACTCG
8301    AAAAACAGGA AGGCAAAATG CCGCAAAAAA GGGAATAAGG GCGACACGGA
        TTTTTGTCCT TCCGTTTTAC GGCGTTTTTT CCCTTATTCC CGCTGTGCCT
8351    AATGTTGAAT ACTCATACTC TTCCTTTTTC AATATTATTG AAGCATTTAT
        TTACAACTTA TGAGTATGAG AAGGAAAAAG TTATAATAAC TTCGTAAATA
8401    CAGGGTTATT GTCTCATGAG CGGATACATA TTTGAATGTA TTTAGAAAAA
        GTCCCAATAA CAGAGTACTC GCCTATGTAT AAACTTACAT AAATCTTTTT
8451    TAAACAAATA GGGGTTCCGC GCACATTTCC CCGAAAAGTG CCACCTGACG
        ATTTGTTTAT CCCCAAGGCG CGTGTAAAGG GGCTTTTCAC GGTGGACTGC
                          NheI                 AscI
                          ~~~~~~~              ~~~~~~~~~
8501    TCGACGGATC GGGAGATCTG CTAGCCCGGG TGACCTGAGG CGCGCCGGCT
        AGCTGCCTAG CCCTCTAGAC GATCGGGCCC ACTGGACTCC GCGCGGCCGA
```

FIG. 4G

```
8551    TCGAATAGCC AGAGTAACCT TTTTTTTTAA TTTTATTTTA TTTTATTTTT
        AGCTTATCGG TCTCATTGGA AAAAAAAATT AAAATAAAAT AAAATAAAAA
8601    GAGATGGAGT TTGGCGCCGA TCTCCCGATC CCCTATGGTC GACTCTCAGT
        CTCTACCTCA AACCGCGGCT AGAGGGCTAG GGGATACCAG CTGAGAGTCA
8651    ACAATCTGCT CTGATGCCGC ATAGTTAAGC CAGTATCTGC TCCCTGCTTG
        TGTTAGACGA GACTACGGCG TATCAATTCG GTCATAGACG AGGGACGAAC
8701    TGTGTTGGAG GTCGCTGAGT AGTGCGCGAG CAAAATTTAA GCTACAACAA
        ACACAACCTC CAGCGACTCA TCACGCGCTC GTTTTAAATT CGATGTTGTT
8751    GGCAAGGCTT GACCGACAAT TGCATGAAGA ATCTGCTTAG GGTTAGGCGT
        CCGTTCCGAA CTGGCTGTTA ACGTACTTCT TAGACGAATC CCAATCCGCA
8801    TTTGCGCTGC TTCGCGATGT ACGGGCCAGA TATACGCGTT GACATTGATT
        AAACGCGACG AAGCGCTACA TGCCCGGTCT ATATGCGCAA CTGTAACTAA
8851    ATTGACTAGT TATTAATAGT AATC
        TAACTGATCA ATAATTATCA TTAG
```

FIG. 4H

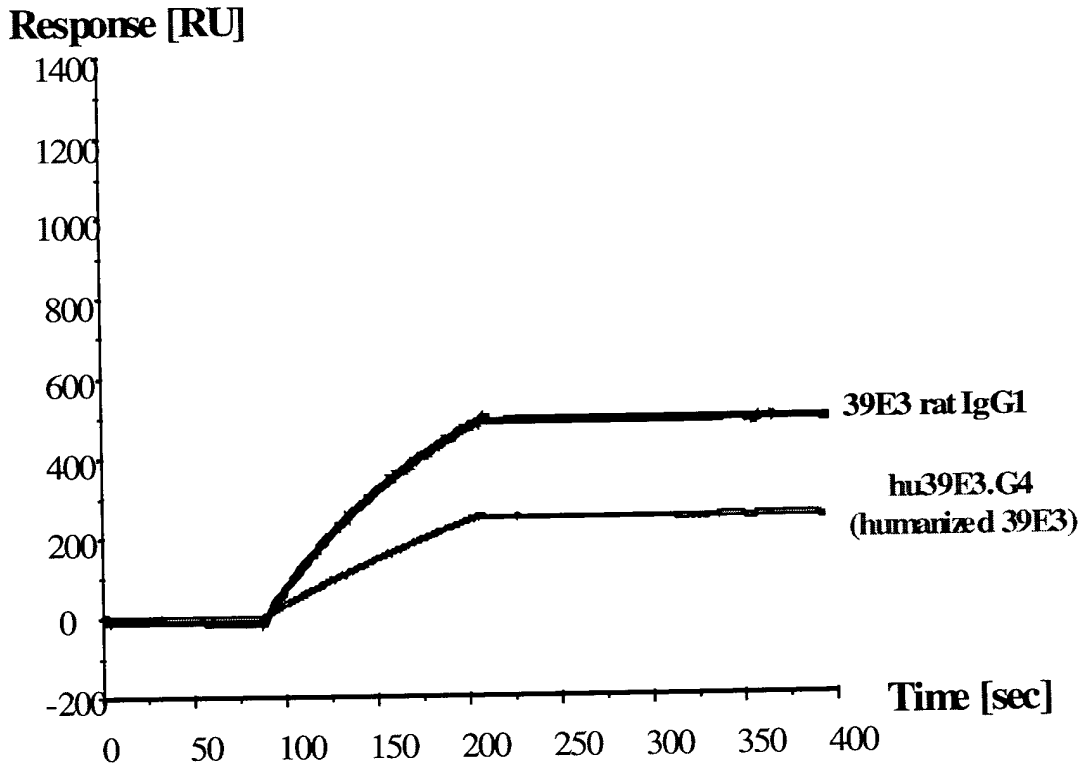
Response [RU]
1400
1200
1000
800
600
400
200
0
-200
0
50
100
150
200
250
300
350
400
Time [sec]
39E3 rat IgG1
hu39E3.G4
(humanized 39E3)

FIG. 5

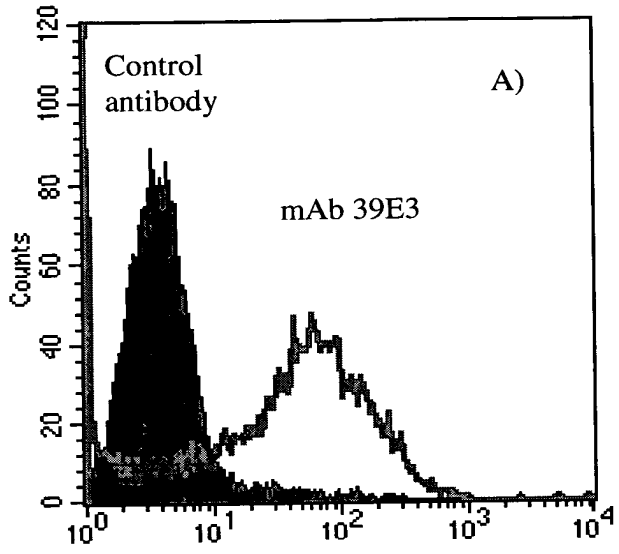
Control
antibody
A)
mAb 39E3
Counts
0
20
40
60
80
100
120
$10^0$
$10^1$
$10^2$
$10^3$
$10^4$

FIG. 6A

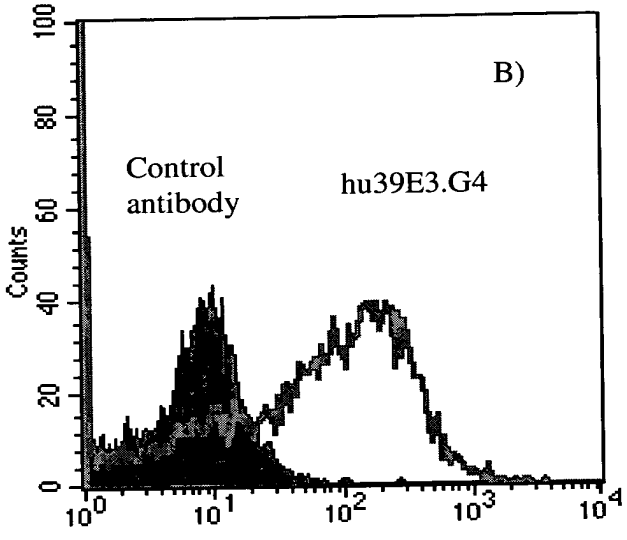
Control
antibody
B)
hu39E3.G4
Counts
0
20
40
60
80
100
$10^0$
$10^1$
$10^2$
$10^3$
$10^4$

FIG. 6B

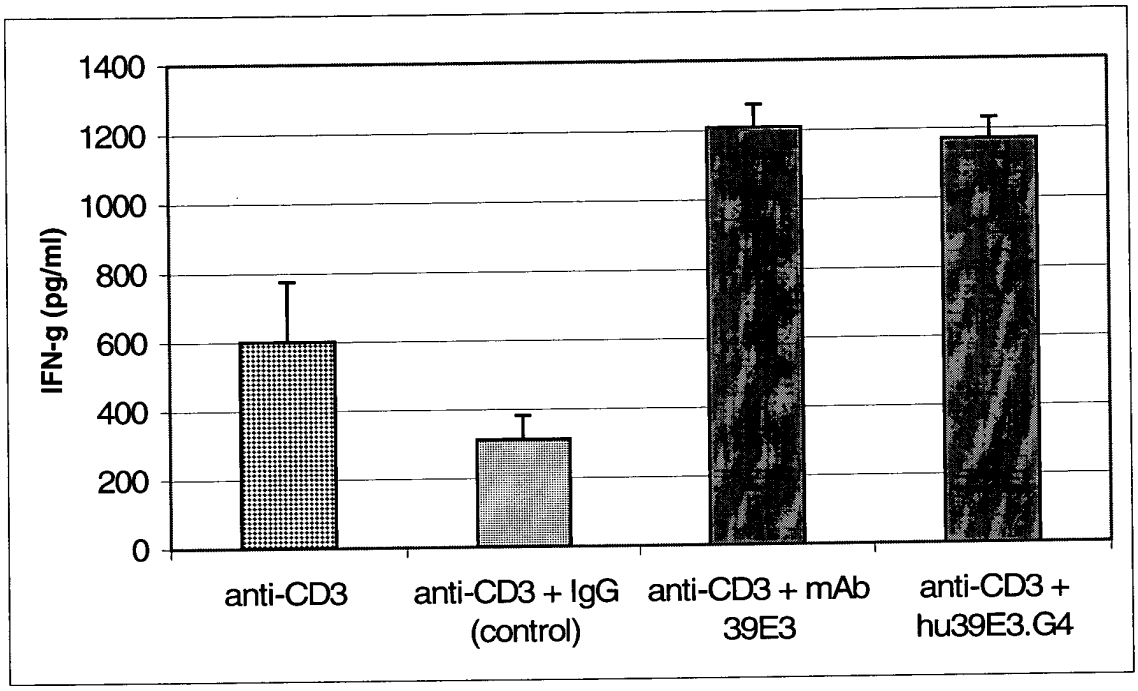
1400
1200
1000
800
600
400
200
0
IFN-g (pg/ml)
anti-CD3
anti-CD3 + IgG (control)
anti-CD3 + mAb 39E3
anti-CD3 + hu39E3.G4

FIG. 7

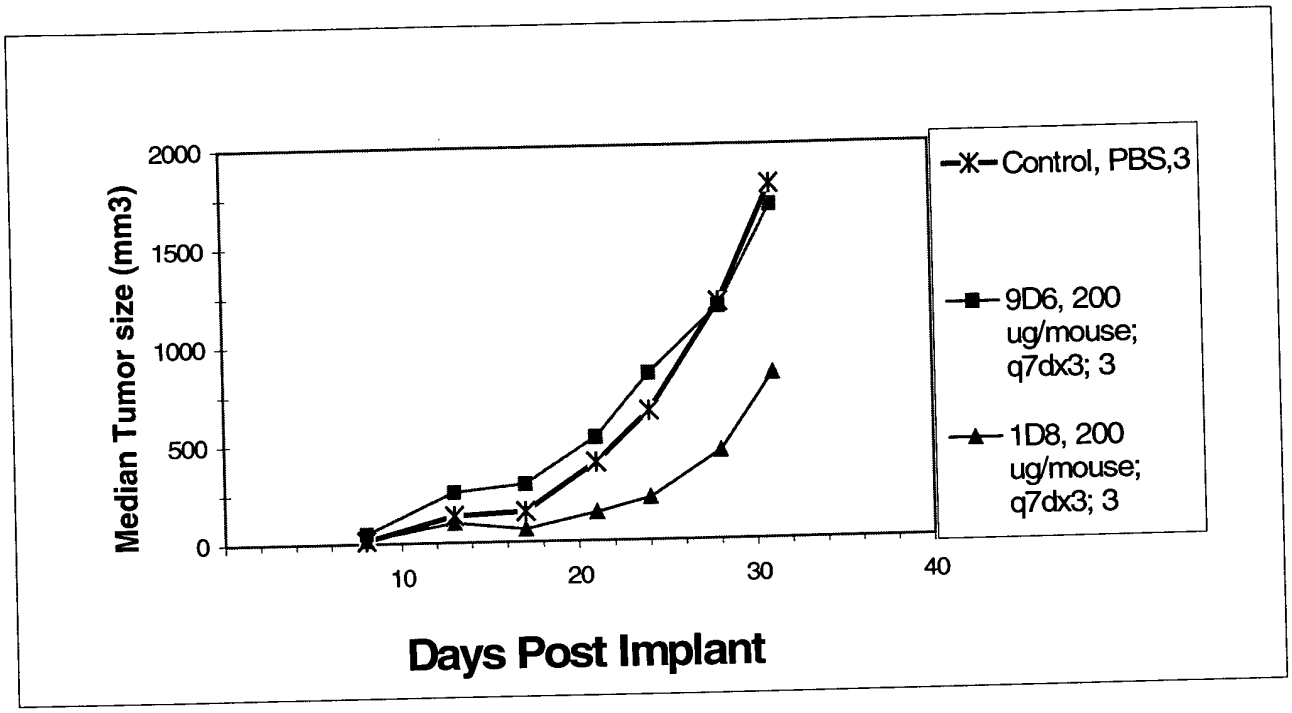
Median Tumor size (mm3)
2000
1500
1000
500
0
10
20
30
40
Days Post Implant
Control, PBS,3
9D6, 200 ug/mouse; q7dx3; 3
1D8, 200 ug/mouse; q7dx3; 3

FIG. 8A

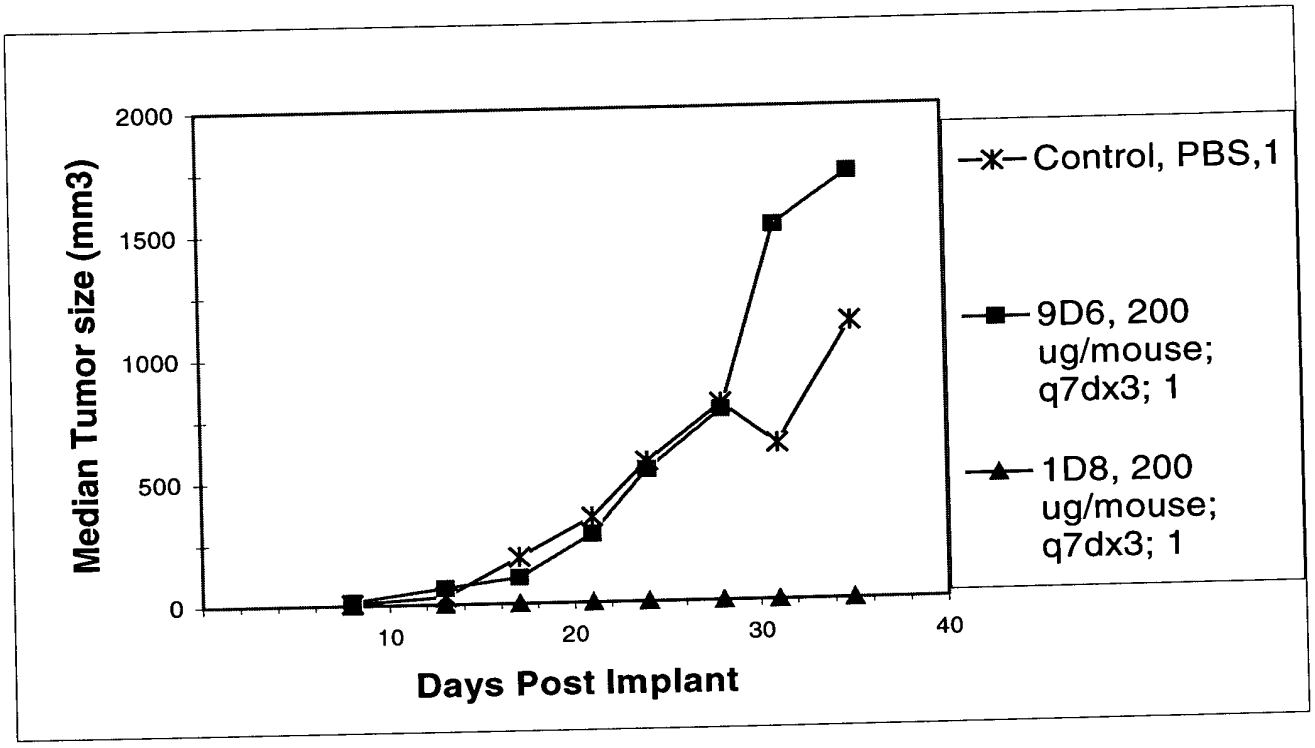
Median Tumor size (mm3)
2000
1500
1000
500
0
10
20
30
40
Days Post Implant
Control, PBS,1
9D6, 200 ug/mouse; q7dx3; 1
1D8, 200 ug/mouse; q7dx3; 1

FIG. 8B

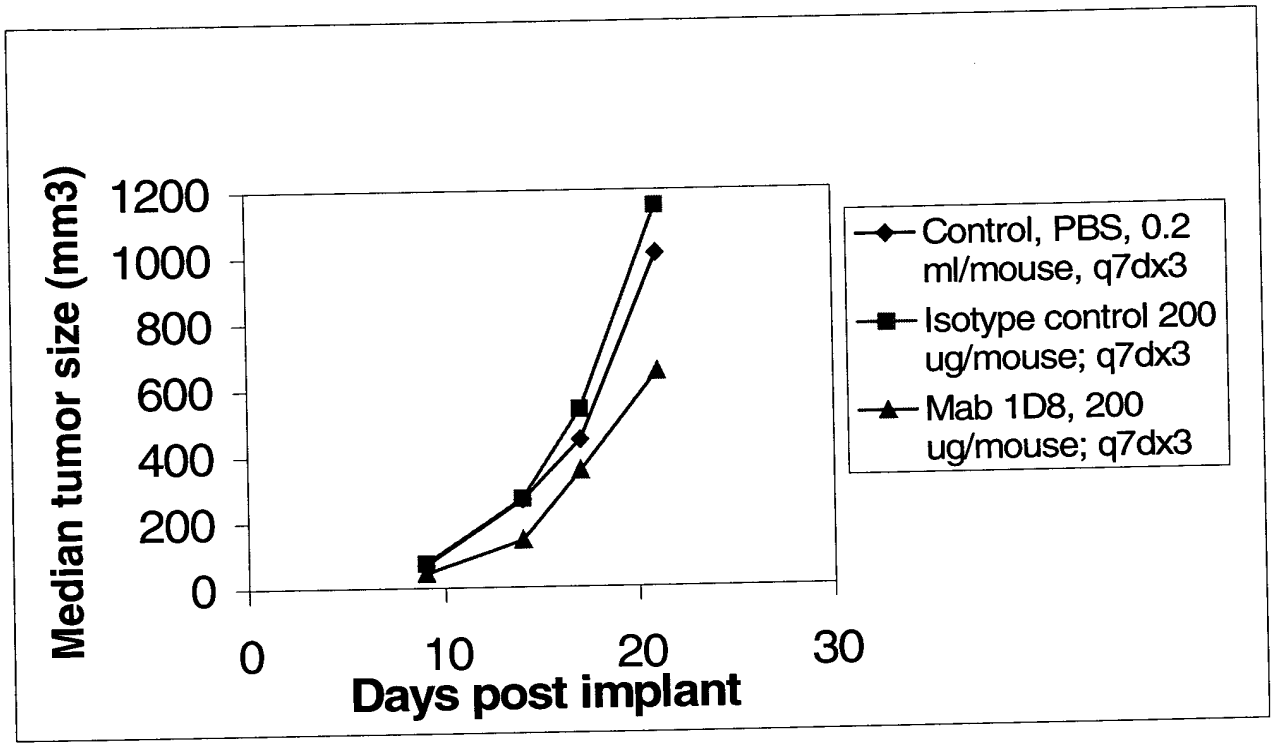
Median tumor size (mm3)
1200
1000
800
600
400
200
0
0
10
20
30
Days post implant
Control, PBS, 0.2 ml/mouse, q7dx3
Isotype control 200 ug/mouse; q7dx3
Mab 1D8, 200 ug/mouse; q7dx3

FIG. 9A

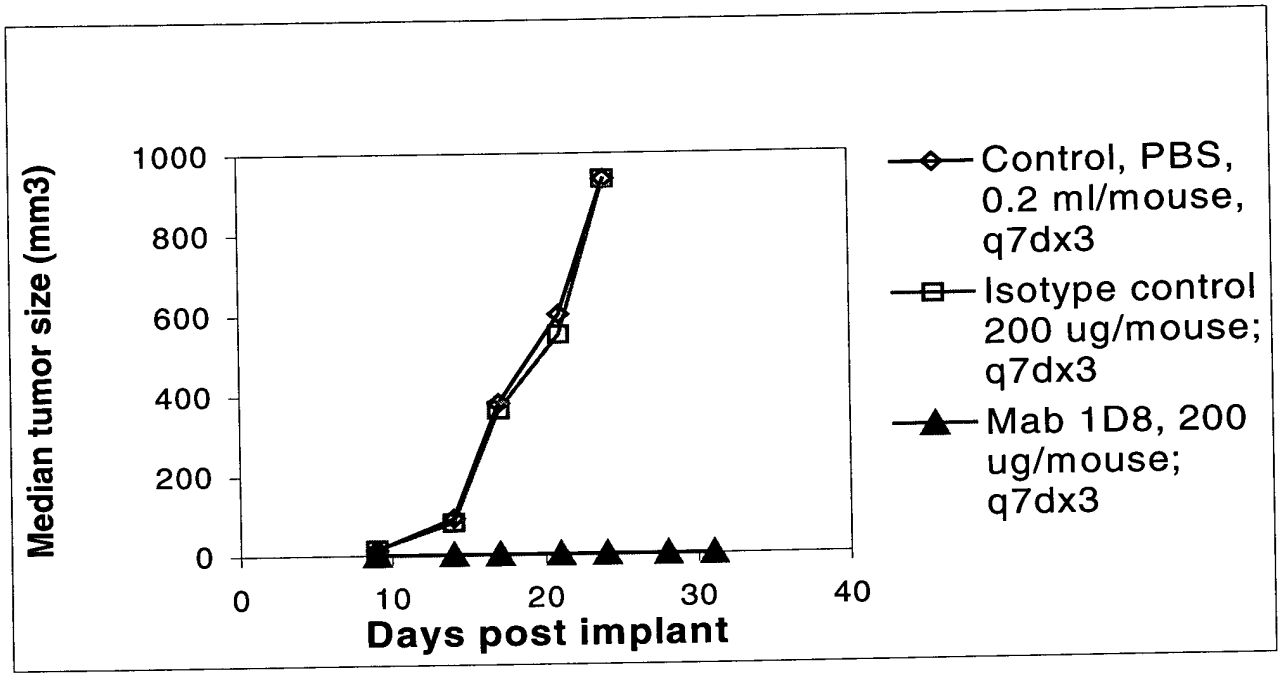
Median tumor size (mm3)
1000
800
600
400
200
0
0
10
20
30
40
Days post implant
Control, PBS, 0.2 ml/mouse, q7dx3
Isotype control 200 ug/mouse; q7dx3
Mab 1D8, 200 ug/mouse; q7dx3

FIG. 9B

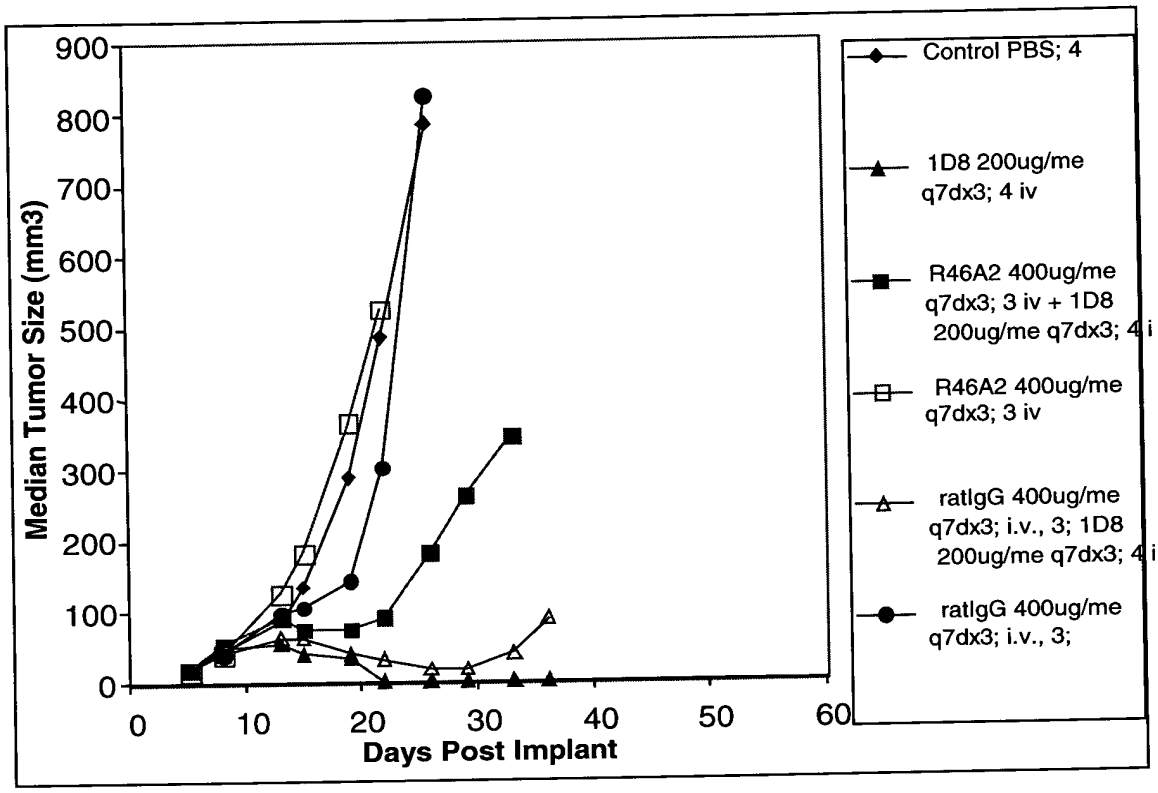
900
800
700
600
500
400
300
200
100
0
Median Tumor Size (mm3)
0
10
20
30
40
50
60
Days Post Implant
Control PBS; 4
1D8 200ug/me q7dx3; 4 iv
R46A2 400ug/me q7dx3; 3 iv + 1D8 200ug/me q7dx3; 4 i
R46A2 400ug/me q7dx3; 3 iv
ratIgG 400ug/me q7dx3; i.v., 3; 1D8 200ug/me q7dx3; 4 i
ratIgG 400ug/me q7dx3; i.v., 3;

FIG. 10